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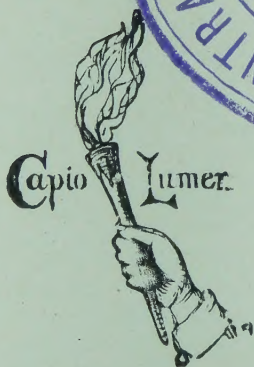
A COMMERCIAL AND TECHNICAL GUIDE
TO GOOD QUALITIES AND DEFECTS

BY

G. SUTHERLAND THOMSON

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DAIRY PRODUCE,"
ETC., ETC.



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PREFACE

GRADING is now practised by the butter and cheese exporting countries of the world. In the next few years the benefits will be outstanding not only in the countries exporting, but in the British market. Grading means a higher standard of quality. It also means protection for the merchant and consumer, and when better understood by the latter it will be more fully appreciated.

It is hoped this publication will be of service to the maker of butter and cheese by detailing defects in quality which lower the grade and market value. To the merchant, who is the servant of the consumer and whose judgment of quality cannot be overstated, it is specially directed. He is a vital factor between the maker and the consumer of butter and cheese, but the relationship between them to-day is too distant and must be brought nearer. Grading is an institution which the small merchant and grocer cannot fail to recognise as invaluable to a higher status of trading, and his fuller co-operation will be heartily appreciated. That it has the support of the wholesale dairy produce trade is not doubted, and the following words of encouragement from Sir Thomas Clement, of Andrew Clement & Sons,

Ltd., to butter and cheese makers in Canada, are welcomed :—

Our experience in the past season regarding grading is to the effect that it has been of decided benefit, and I think every one now wonders why it was not done before.

Grading of cheese, no doubt, will come in Britain, just as butter grading is about to be enforced in Ireland. In South Africa, where grading of export butter and cheese is compulsory, the application of the Dairy Act to cheese for local consumption is proving profitable, as shown in these lines from the Superintendent of Dairying, Mr. Ed. O. Challis :—

I have found the grading of cheese for local consumption to be extremely beneficial in developing the cheesemaking industry, for, although not compulsory, a very large percentage of our factories have their cheese graded regularly every month, and the graders, being expert cheesemakers themselves, are able to keep the various cheesemakers on the right lines when they find their cheese below the standard required.

G. SUTHERLAND THOMSON.

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BUTTER

Descriptive Terms of Butter, with Explanations and Suggestions

Following is a summary of the terms dealt with :—

Flavour.—Clean and Attractive. Brisk.

Taste.—Chemical : Soda. Borax. Salty. Bitter.
Dead. Embalmed. Scalded. Flat. Dull,
Weak or Insipid. Woody. Heated. Fatty.
Rank. Cowy. Sour. Aged. Cheesy. Oily.
Tallowy and Lardy. Stale. Weedy. Unclean.
Fishy. Rancid.

Texture.—Smooth and Waxy. Firm and Close.
Heated. Oily. Strong. Stout. Loose. Weak.
Dry, Hard and Brittle. Milky and Cloudy.
Overworked. Fatty. Greasy and Sticky.

Colour.—Uniform. Pale and White. White Specks.
Dull. Two opposing colours. Irregular. Streaky.

Salting.—Fixing the Flavour. Uneven. Undis-
solved. Gritty.

Finish.—Poor. Heated. Mouldy or “Spotty.”
Parchment. Boxes and Casks. Stencilling.

Hidden Defects

Much danger can be concealed in butter. A bad
breath in a person is not a healthy sign, yet the
person may feel perfectly well. The breath may be

termed a forecast of internal derangement, and when really bad something is wrong. Butter may have a perfectly clean flavour, in fact, superfine, but the aroma of the butter—the breath—may show staleness or one or more defects, as the author has repeatedly found in otherwise choicely flavoured butter. When the breath is unhealthy, search the body. Between breath and body you are likely to get your answer. Concealed flavours are the snakes in the grass of the grader.

We may liken the butter and cheese grader to the general medical practitioner, and the lines of the world-famous heart specialist, the late Sir James McKenzie, are worth repeating :—

The study of disease will not advance till the general practitioner becomes a research worker, because the general practitioner alone sees the earliest stages of disease.

The grader knows that science plays a vital part in detecting taints and defects in butter and cheese ; his duty is to diagnose them. Bacteria, the great producers of flavour, taste, aroma, smell, and the ills of texture and colour are always with him.

Disappearing Defects

A taste in butter may be directly attributed to the food of milk cows, and although at times very objectionable, it may disappear at certain storage temperatures. Generally speaking, food flavours and taints undergo more rapid changes than bacterial flavours and taints. A great field is open

to cold storage research to correctly determine the changes which take place. The author has given years of study to this subject and fully appreciates what research has in store for the dairy-ing industry. (See Weedy Taste).

Sampling Dairy Produce

It is felt necessary to make clear, definitions which govern the examination of milk, cream, butter, and cheese.

DEFINITIONS

Flavour more correctly applies to the delicate substances produced in clean, healthy dairy produce, which agreeably respond to the palate.

Examples : Choice, Superfine, Special, Fine, Creamy, Fresh, Sweet, Mild, Clean.

Taste should apply to what is unpleasant and not agreeable. There should be a clear distinction between flavour and taste. One speaks of a food other than butter and cheese having a bad taste, meaning it is disagreeable. The distinction should be more marked with produce of a delicate kind.

Examples of a disagreeable taste : Rancid, Stale, Aged, Fishy, Metallic, Weedy, Oily, Rank, Tallowy.

Aroma refers to what is volatile or given off by a clean, pure flavouring or by a healthy change. Aroma is the breath of these pleasant substances.

Examples : Creamy, Choice, Superfine

Special, Clean and Healthy, Fresh and Clean, Delicate.

Smell, like *Taste*, points to an inferior grade. “The milk has an unpleasant smell.” “The butter smells strongly of tallow.” “The cheese smells of age.” These descriptions sound more correctly.

Examples: Stale, Rancid, Tallowy, Cowy, Weedy, Unclean.

Commerce and Technique

It would be wrong to say that commercial and technical men are drawing their weight like a well-trained and seasoned team of draught horses. If they were, much greater would be the benefits to dairying. The commercial side of butter and cheese leans heavily on the technical side. In more ways than one the butter and cheesemaker in the overseas dominions and abroad is far removed from the British consumer. The commercial man sees much bad quality; escape it he cannot. He has often drawn attention to it without any gratitude; in some cases he has been silenced. A spirit of helpfulness requires creating between the big and small merchants on one side and the technical advisers and manufacturers on the other side. Let neither usurp authority.

Butter-making “Secrets”

The chief “secrets” are in the milk and cream supply, and *not* in manufacture. A neglected milk

and cream supply cannot be corrected in the creamery ; the damage can only be partly arrested by scientific methods.

Grading *versus* Judging

It is of vital necessity for graders to take into consideration the keeping properties of butter. This cannot be too strongly impressed. When grading export butter in New Zealand, Australia, and foreign countries, the author would suggest discounting two points to compensate for deterioration, except in the case of the less persistent weedy and food flavours. For example, butter grading 90 points should be accepted as 88, and butter grading 93 as 91. This would bring "choicest" butter into a more reliable quality.

Judging butter at shows is distinct from grading. It is judging the quality on the spot without consideration for its future, which is an obvious weakness. Cold storage and the mould count should be favourably considered. The British Dairy Farmers' Association, or the Royal Society of England, or the Highland Society of Scotland may see a way to give a lead in this connection.

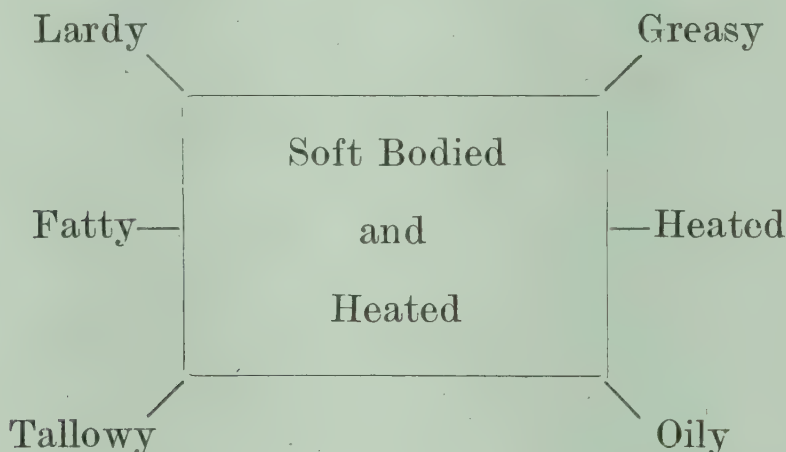
"Jumpy" Butter

Butter may be of good quality to-day, but it goes "off" quickly. It may be called "jumpy" butter. It is usually pasty bodied, and "jumpiness" and texture are generally in sympathy. Test very carefully the breath and the body of butter from districts

productive of a quality considered unreliable or open to suspicion.

Dual Defects

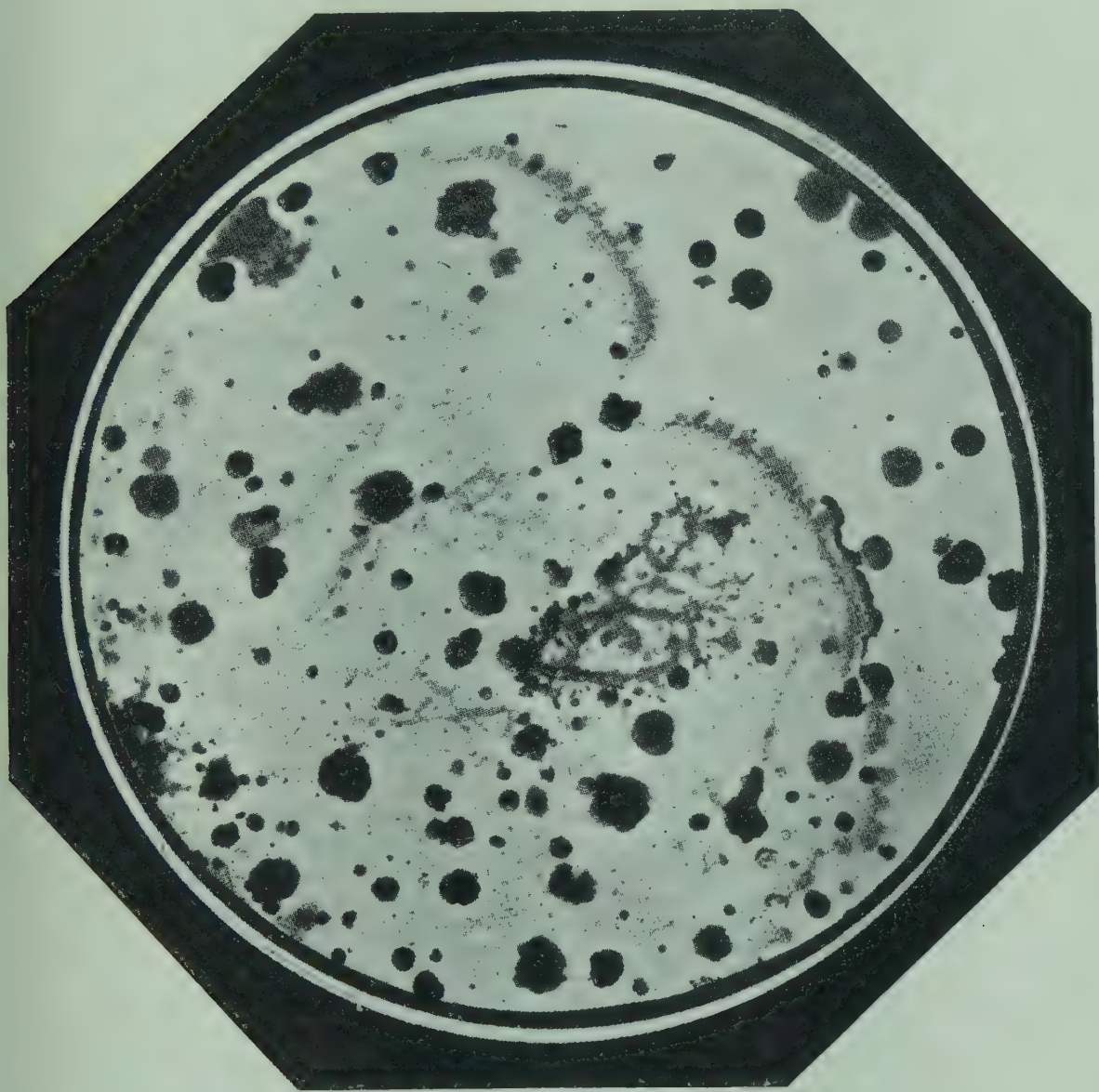
Butter tasting lardy, greasy, oily, fatty, tallowy or heated frequently shows an injured texture and a dullness of colour. In soft-bodied and heated butter the grader will find the taste characteristic of one or more of the defects herewith illustrated.



Yeasts and Moulds

Yeasts and moulds do considerably more damage to butter and entail heavier losses in marketing than buttermakers are aware of. A "suffocated" taste, also mustiness, woodiness and rankness, are associated with yeasts and moulds, and research work is necessary to prove the extent of the connection of other defects which are suspected to be caused by yeasts and moulds. These organisms readily enter the milk and cream supply. Wooden utensils are their happy hunting ground, and old churns and butterworkers are invariably contaminated.

Investigations have shown raw cream] to contain 200,000 moulds per cubic centimetre, and 900,000 yeasts per cubic centimetre. The effect of this

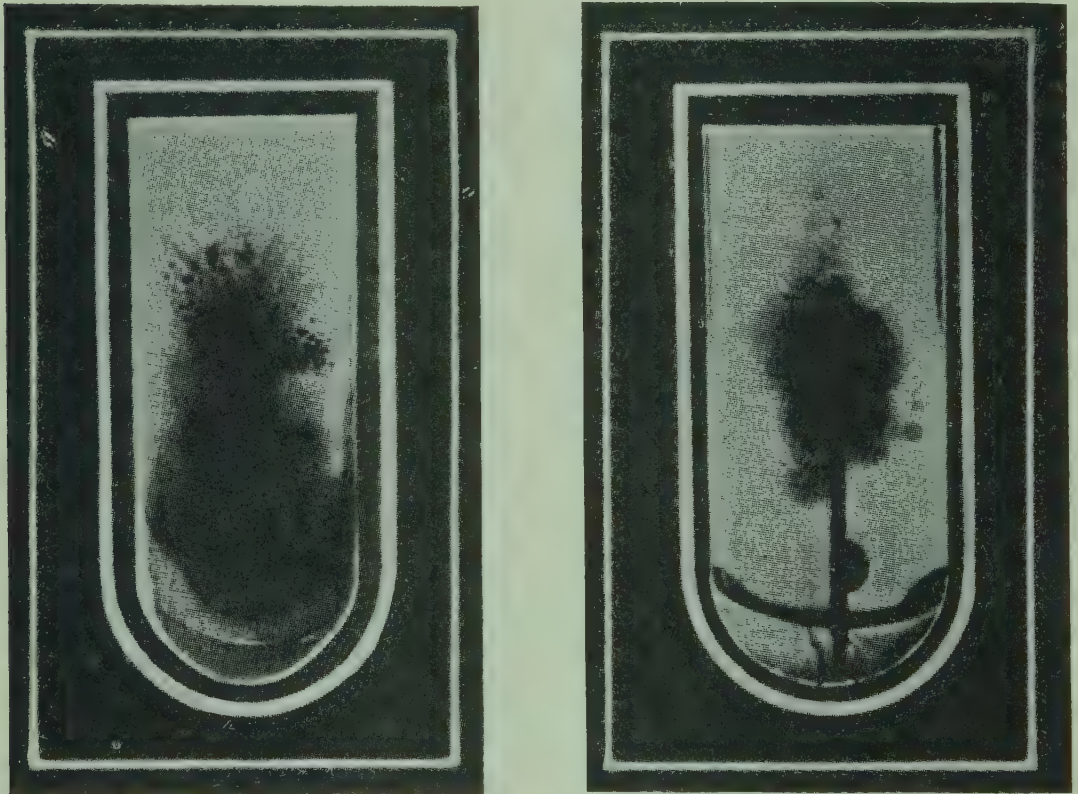


CULTURES AND GROWTHS FROM AIR IN MILK AND CREAM ROOM. Colonies represent varieties of injurious bacteria and much mould is present. Culture plate was exposed to the air ten minutes. (Sutherland Thomson.)

heavy contamination on the flavour and keeping properties of unpasteurised butter must be considerable, more particularly if the butter is exposed

to high and fluctuating storage temperatures, and if stored in damp and badly ventilated atmospheres.

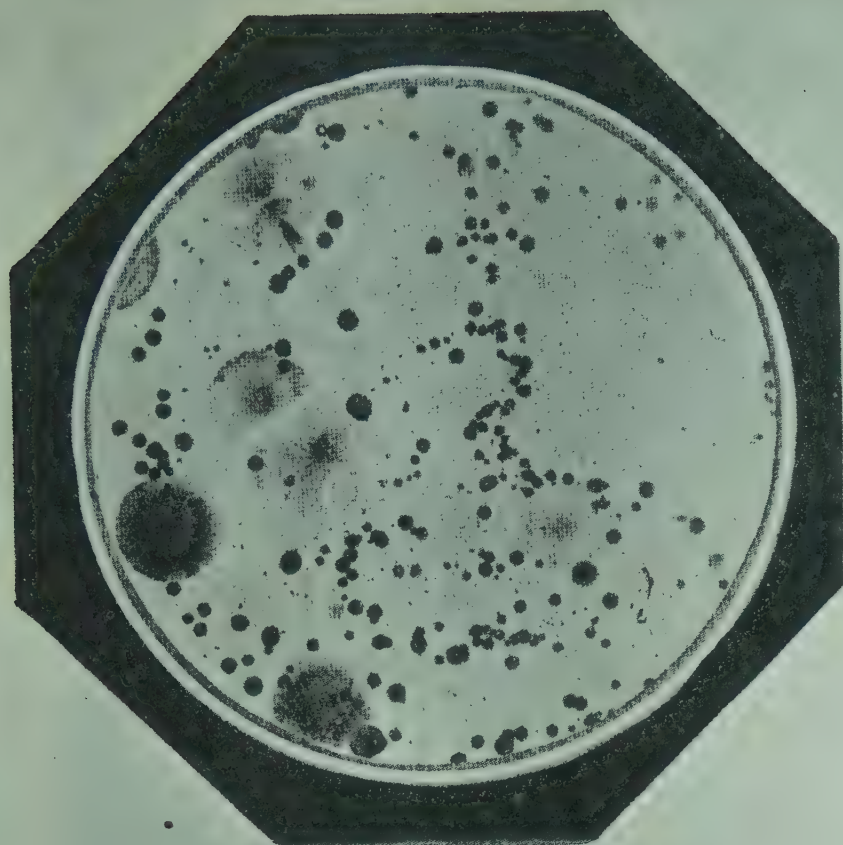
To destroy yeasts and moulds in the wood of churns and butterworkers is not an easy matter once they have penetrated the wood. Yeasts and moulds also



Smear Culture from Cream, showing mould. Stab Culture from Butter made from the Cream. Moulds are abundant. This butter was rancid. (Sutherland Thomson.)

enter butter through the medium of parchment and salt, and much care is required to keep them free of contamination. Before use, parchment should be treated with a strong preservative, and in the case of salt it is very necessary to make periodical bacteriological examinations to determine its freedom from taint-producing organisms.

A



B



A. Tainted Creamery Milk. (Sutherland Thomson.)
Plate illustrates numerous colonies of bacteria and growths of
mould from one drop of milk.

B. Sterilised Milk free of colonies,

Another source of entry of yeasts and moulds to butter is the wood of the boxes and casks. Moulds may be found in very considerable numbers in unseasoned wood, and also in wood that has been stored under conditions exposing it to contamination.

Merchants look upon "spotty" (mouldy) butter with concern, and disrate it in price and quality. The opportunity is the merchant's, and advantage is taken of it which is not unreasonable.

Moulds point to infected milk and cream, and the infection may be disastrous, as moulds indicate a bad source of contamination. Generally speaking, millions of bacteria accompany them.

When the author sees moulds in butter, he becomes suspicious of hidden defects.

The danger of yeasts, moulds and bacteria should be made educational in order to arouse a universal effort to reduce the contamination. Yeasts and moulds flourish at a temperature of 50° F.; also, they grow at a comparatively low temperature, and moulds can multiply freely in butter of low moisture content. They prefer a high cream acidity, showing the advantage of keeping the acid low for butter-making. Sterilisation of wooden and metal utensils, churns, pipes, drains, etc., by a boiling solution of soda followed by a boiling solution of lime is recommended.

It is very important to note that moulds will penetrate a whole box or cask of butter and produce rancidity.

Butter may be heavily impregnated with the spores of mould without the slightest indication of mould on the surface of the butter, on the parchment, or on the wood. But it may be detected in the flavour. When a stage is reached that is congenial to the hatching of the mould, it will become apparent. Much is being done to preserve the appearance of butter from mould, but the internal danger is overlooked. (See Casks.)

Pasteurisation of cream, followed by ripening with a pure culture, will give a high degree of purity and cleanliness. Butter from this quality of cream possesses valuable keeping properties, which bring it into a class having the choice flavour fixed.

Fixing the Flavour and Bacterial Count

There are various reasons for saying that the quality and market value of butter depend on the fixity and duration of the good flavour and a mould count. By introducing a mould count a very progressive step would be taken to raise the quality. As already remarked, mould means other harmful germs. Not only would the mould count be a powerful factor in helping to clean up sources of contamination of milk and cream ; as suggested by Dr. Hood, Canadian Department of Agriculture, it would be an index to the efficiency of pasteurising and ripening cream, and the condition of churns and appliances, also to reinfection by mould-infested pipes and creamery equipment. Doubtless

overseas Governments and dairy organisations will find it necessary to include in their valuable grading schemes a continuous system of cold storage tests and counts which will make possible comparisons with results obtained after the produce has reached the British market.

Moisture in Butter

There is no more satisfactory way of finding out the moisture content of butter than by analysis. The use of the moisture balance is a good practical test, and can be recommended. Buyers still rely on the iron (trier) as a guide to the moisture content. The following, by the author, will show the fallibility of the grading iron :—

No. of sample.	Percentage of Water found.	Indications of Moisture on Trier.
1 . . .	9.0	Very dry.
2 . . .	12.5	Very moist.
3 . . .	10.9	Very moist.
4 . . .	14.1	Very dry.
5 . . .	10.1	Moist.
6 . . .	11.0	Moist.
7 . . .	11.8	Dry.
8 . . .	11.5	Very moist.
9 . . .	11.5	Moist.
10 . . .	11.4	Dry.
11 . . .	11.5	Dry.
12 . . .	10.5	Very moist.
13 . . .	11.2	Dry.

No. of sample.	Percentage of Water found.	Indications of Moisture on Trier.
14 . . .	11.3	Dry.
15 . . .	10.1	Dry.
16 . . .	10.2	Dry.
17 . . .	12.2	Very moist.
18 . . .	13.2	Dry.
19 . . .	11.4	Very moist.
20 . . .	12.3	Fairly dry.
21 . . .	13.3	Moist.
22 . . .	10.4	Dry.
23 . . .	10.0	Moist.
24 . . .	15.0	Dry.
25 . . .	14.8	Dry.

No. 4 shows a high percentage of water, with a very dry appearance by the trier; the butter was unsalted, and with this class of butter 20 per cent. of water may be present without any indications of excess being noticeable on the iron.

Leaking Butter

Leakage of moisture may cause much loss in weight. It is necessary to state that moist butter must not be confounded with leaking butter, as a butter may show a good deal of free moisture without heavy shrinkage.

Leakage is attributed to various causes, and to deal fully with them one cannot overlook the influence of succulent food, that is, food of cows

showing a high percentage of moisture and a low percentage of mature constituents. This gives the cream a soft fat or a less mature fat, which influences churning and working and calls for lower temperatures. The author has compared notes with other experts, and additional causes of leakage are given as follows :—

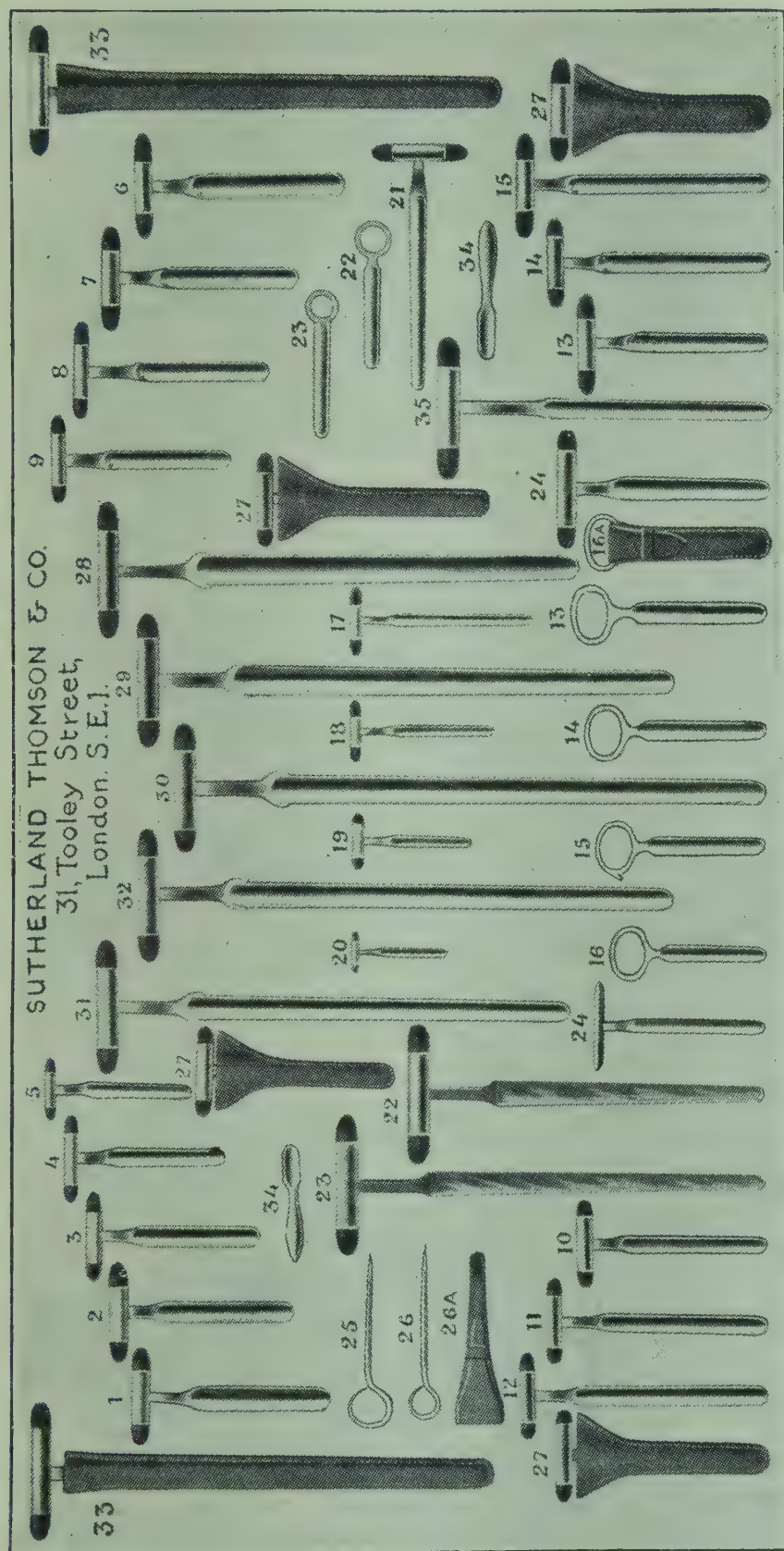
- (a) Churning cream at high temperatures and trying to compensate for this by washing the butter at specially low temperatures.
- (b) By overloading the churn with cream. It is therefore, advisable to churn moderate quantities of cream.
- (c) Underworking the butter is probably the principal cause, and if buttermakers would carry out a simple experiment in this connection, very valuable evidence would be obtained.

An addition of eight to ten revolutions of the workers would show to what extent the moisture content of the butter is reduced.

- (d) Storage of butter at low temperatures; in other words, leakage is greater in a drying atmosphere.
- (e) Excess of salt adds to leakage.

Grading or Sampling Irons (Triers)

Little is necessary in the way of equipment. A “Hislop” iron of a length suitable to boxes or casks, bottles for holding samples for analyses, and muslin are the chief requirements.



“HISLOP” IRONS FOR BUTTER AND CHEESE SAMPLING.

Nos. 1-9.—Cheddar, Cheshire, Lancashire, Gruyère, Emmental, and other varieties of pressed cheese.
 No. 21.—Parmesan. Nos. 15, 16, 22 and 23.—Loaf Cheddar, Dutch and Danish cheese, and smaller varieties of pressed cheese. Nos. 10-15.—Stilton. No. 24.—Gorgonzola and Roquefort. Nos. 19 and 20.—Soft cheese.

On getting a true representative sample of butter or cheese, much depends on the *cutting* and *drawing*

qualities of the trier ; also the weight of the trier and the balancing are important factors. The surface of the steel and the tempering of the steel embody processes which are jealously guarded.

Slim irons which may be seen in use are not balanced to cut butter properly ; also some irons have the weight in the wrong part of the blade. A day's work with one of these irons will tire the operator unnecessarily, and in the testing of strong-textured butter or butter at a low temperature the advantages are with the stout iron.

For butter and cheese sampling, a first-class iron is an investment no grader or buyer can afford to part with ; it is handed down by father to son.

We shall now deal with the good qualities and defects in butter.

FLAVOUR

Bloom of Lactic Acid in Butter

There is something lacking in much butter imported as " choicest." In the opinion of the author, it is the fine, delicate lactic acid flavour peculiar to pasteurised butter, which is ripened by a vigorous starter of outstanding quality. The acid contributes in a most valuable way to the fixing of the butter flavour, and, consequently, careful consideration must be given to the quality and quantity of salt used.

To destroy that great commercial canker in butter, namely, mould, high pasteurisation of cream is

necessary, but in the absence of a vigorous starter a cooked taste is given to the butter. Obviously, the acid of the starter enters into combination with the cooked taste, resulting in a flavour that is decidedly pleasant. Under existing conditions it is not lasting, but with transport and refrigeration of butter as they should be, both the flavour and the health-giving value of the acid would be much more profitably preserved.

Clean and Attractive

With cream of good clean quality, properly pasteurised and ripened, and with butter well made and preserved with the best quality of salt, the good flavour in the butter may be considered fixed, and will be retained for many weeks at suitable storage temperatures. The flavour so much prized may be described as rich and creamy, fresh and creamy, mild, sweet, fine and clean. With advances in the science of foods, butter may be made with a guaranteed vitamine content and sold under some such name as "Sunlight" butter. The influence of sunlight on milk vitamins is already attracting attention.

Brisk Flavour

Briskness is found in salt butter of character and body. When ironed, the butter comes up full and vigorous, so to speak, and this quality is frequently seen in butter which has not been neutralised.

Chemical Taste

Soda.—This taste is readily recognised, and is the result of over-neutralising cream with a solution of soda.

Borax.—Butter that is preserved with this chemical may contain uneven quantities, and “pockets” of the chemical following careless mixing of the boron compound with the butter. Neutralised butter that is salted and in addition contains borax may develop a taste which is characteristically chemical and objectionable.

In Colonial butter, boron is active and decidedly helpful between the time the butter is made and refrigerated at the port of shipment. This period in many instances decides the keeping properties and value of the butter on the British market.

Salty Taste

Insufficient working of butter gives salt an intensifying effect, and this is specially noticeable in leaking butter, in which evaporation is increased by virtue of the heavy salting.

Bitter Taste

This defect sometimes follows the kind and quality of food of cows (note Weeds), and also contamination of the cream supply with bacteria of the *B. coli* group and certain moulds. Also, bitterness is frequently caused by impurities in the salt used, and by excess of salt (see p. 48). Certain defects in butter are made to taste bitter by the action of salt, and this

calls for care by the grader. The author has repeatedly found a tallowy flavour in butter, but after a period of cold storage it was replaced by a pronounced bitterness.

Dead Taste

Butter is manufactured for export with the choice flavour dead, but the butter has exceptional keeping properties. The treatment of the cream and precautions in the manufacture of the butter chiefly provide the “preservative.” The question arises, “Can this butter be technically and commercially called ‘choicest’?” It can, on the basis of its long period of freedom from deterioration. On the other hand, it has no right to be called “choicest,” because it does not possess a choice flavour. It is dead. The grader of this class of export butter would be well advised to thoroughly search the texture as well as the flavour before awarding the riband of quality.

Embalmed Taste

By carrying science of manufacture too far, butter may not only have a dead taste; it may be embalmed. When butter keeps “indefinitely” as a result of the embalming the time has come for a hasty return to less modern practices.

Scalded Taste

Pasteurised cream gives to butter a taste, and also a faulty texture, which can be recognised. It is the degree of heat and “artificial” ripening which make

detection without resource to laboratory tests possible. With an increase of temperature, the flavour responds until a cooked or scalded taste is found in the butter.

Flat Taste

When the palate finds no character in the butter, it may be described as flat. Such a taste is likely to develop into something fatty or cheesy, more probably the latter.

Dull, Weak or Insipid Taste

These may be grouped together. The taste of the butter resembles a neutral vegetable fat like coconut. "There is no life in the butter," the merchant will say. It is a sacrifice of the choice flavour for an extended keeping quality.

Flavourless butter may also be partly attributed to churning under-ripened cream. Immature food, such as rank herbage grown in low-lying lands, favours an insipid taste in butter, and the weakness is increased if the butter is washed too freely. Overwashing is probably a premier cause.

Again, there is what may be termed a constitutional weakness in the flavour of butter, a weakness peculiar to the district in which the butter is made.

Also note that insipid butter should be very mildly salted, otherwise it will have a taste of salt and not a flavour improved by salt. With such a class of butter there is little flavour for the salt to fix, and salt does not create a flavour, it only blends

with it ; in other words, it fixes, which is interpreted as preserving the flavour.

Woody Taste

Defects caused by yeast may be confounded with a taste in butter directly attributed to the wood of the boxes or casks. To help to determine the cause, the parchment and the butter down the sides of the boxes or casks should be carefully tested.

Heated Taste

When butter is exposed to high temperatures, the fat may absorb the heat and produce a distinctly heated taste. This specially applies to butter of an insipid character.

A heated taste caused by atmospheric temperature is distinct from defects caused by over-pasteurising the cream. The taste produced more resembles scalded cream.

Fatty Taste

It is generally associated with the age of butter. Those experienced in the examination of butter are familiar with a fatty taste in supplies that have been stored for many weeks at temperatures over 32° F., that is, freezing point. This *high* temperature, however, does not cause a fatty taste in butter of choice quality unless the storage is faulty and the period of refrigeration extended to months.

Fattiness may develop readily in butter of *weak flavour and weak texture*, and this class of butter is

easily injured by high fluctuating temperatures. Weakness of flavour and texture is shown to have a relationship to butter of a greasy, tallowy and lardy taste and texture.

Rank Taste

It is largely associated with the food of cows, and can be considerably reduced in butter by low temperatures.

Cowy Taste

It is of common occurrence, and, as a rule, is not objected to by British buyers and consumers, but steps should be taken to reduce its prevalence.

The use of the milk of cows for a few days after calving is the principal cause. Also, it is attributed to the milk absorbing the cowy atmosphere in badly ventilated cowsheds, and in dairies which are in too close proximity to the cowshed. Bacteria commonly found in cow dung will produce a cowy taste, and this should be very carefully noted.

Sour Taste

Sourness is a stage beyond acidity, and may be said to be midway between acidity and staleness. It is directly attributed to a faulty cream supply.

Aged Taste

This follows on the lines of staleness, but the flavour is not so clearly defined. The butter impresses one as prematurely old.

“Suffocated” cream will give to butter a flavour

of age, also churns which have not been properly aired. Again, an “aged” (stale, musty) atmosphere will give to cream a flavour indicative of age.

Cheesy Taste

This is characteristic of cheese, and points to old heated cream, also cream vessels which have not been properly cleansed. One may have had occasion to observe the fat of cream adhering to the inside of vessels, and if this fat remains long enough it develops a cheesy condition, which inoculates the supplies of fresh cream with the cheesy organisms. Butter made from “fatty” (salvy) cream is more subject to cheesiness, and if exposed to high fluctuating temperatures the taint becomes more pronounced. “Fatty” cream requires great care in churning and working.

Oily Taste

Oily defects may be brought under two headings—vegetable and mineral; also, there is a peculiar neutral oiliness, and one cannot overlook a taste which strongly resembles sperm oil, but which is different from a fishy taste. This defect in all probability would be noticeable in butter at the time of manufacture. The drinking water of cows and the water used for washing the butter are probable sources of contamination; also, the oily taste may arise from decomposition of the butter fats brought about by organisms in the cream supply.

Butter of weak body is predisposed to oiliness, a fact which should be kept in mind by butter-makers.

Tallowy and Lardy Taste

These are considered very objectionable, even when the butter is to be used for blending purposes. The defects are of a highly permanent class, also the texture of the butter suffers. Tallowiness and lardiness inflict a dual injury on the quality and selling value of butter.

For the cause one must go back to the cream supply. Exposure of cream to bright sunlight will produce a tallowy flavour; also thick cream, that is, cream containing a very high percentage of fat, is more subject to tallowiness, and the danger is increased by "suffocation" of the cream in the containers and by high temperatures.

Great care should be exercised in the churning and working of this class of cream, keeping temperatures in mind, as violent fluctuations are specially injurious, and the same applies to the transport of the butter.

Cream from the milk of cows fed on soft slushy herbage is subject to a tallowy taste, and if over-ripe cream is heated and cooled rapidly the danger is increased. Working butter when too hard should be avoided.

Bacteria are known to produce tallowiness, and the bacillus of hay is probably one of the worst offenders.

Stale Taste

Experience shows that if one (1) gallon of stale cream is added to ninety-nine (99) gallons of choice cream and made into butter for export, a second-grade quality is likely to result. Why ? An inoculation of 1 per cent. is very heavy, and propagation of the destructive germs in ninety-nine (99) gallons of choice cream is rapid and vicious, no matter what effort is made to stem the injury. In cheesemaking, the addition of 1 per cent. of starter to the milk gives, in a few hours, a quick development of acid, and the action of the starter is recognised at every stage in the making of the cheese, and lastly in the finished product. Consider for one moment the millions of germs per cubic centimetre in the gallon of stale cream, which means that in every cubic centimetre of the hundred gallons (99 gallons choice and 1 gallon stale) there will be a large number of these destructive germs. In the freshly-made butter from this supply of cream, the grader who is not aware of the "inoculation" is at a disadvantage, and is likely to grade the butter higher than it warrants, because sufficient time has not been given for the growth of the bacteria which are productive of staleness. We will assume that the butter is passed as first grade and goes into store at a temperature of 25° F. It remains there for a fortnight and is then transported by rail many miles, covering a period of days, and, further, we will assume that

the temperature of the butter during this period does not fall below 50° F. What follows? The bacteria productive of staleness are at work changing the butter to a second grade, and this is very likely to be serious if the butter is stored in the "cold" chamber of a steamer for additional weeks under unfavourable conditions of temperature.

Staleness will grow at a temperature of 25° F., which the author proved many years ago by cold storage experiments. It, therefore, follows that great care should be exercised in grading to safeguard as far as possible against errors arising from causes explained.

Stale flavours in butter are very condemnatory of quality, and all classes of buyers object to the butter, knowing from experience the difficulties to be faced in distribution to consumers.

Weedy Taste

Very heavy losses have occurred through plant taints, especially those caused by garlic, wild mustard, cress and turnip.

The author many years ago proved by cold storage investigations that low cold storage temperatures will destroy plant taints if they are not too firmly fixed in the body of the butter. Garlic, however, is one of the exceptions.

A weedy taste is sometimes confounded with yeast and mould, and much care is necessary to escape error.

As a preventive, one turns to the feeding of the

cows, and where practicable the changing of cows from one pasturage to another is recommended.

Aeration of the milk is certainly beneficial, and also aeration of the cream, that is, running the milk and cream over a cooler through which a stream of cold water passes. Volatile weedy flavours escape under this treatment.

Again, quick ripening of the cream to hasten the development of gases is helpful, and churning the cream in reduced quantities to encourage a more perfect ventilation of the gases.

Unclean Taste

When difficulty is found in describing a bad taste, it is termed "unclean." Conditions arise which give to milk, cream, and butter, taints which may be entirely foreign to the most experienced and enlightened grader. The mineral condition of the soil operates on butter, and at periods of the year, probably following drought or a heavy rainfall, a metallic taste may be found. Again, there is the blending of a flavour with a taint, which may be productive of a taste that can only be called "unclean." Further, milk, cream, and butter may absorb from the atmosphere bad odours which may change sufficiently to destroy all comparison with the original taint.

Fishy Taste

During the author's service as Chief Dairy Expert to the respective Governments of South Australia

and Queensland, he discovered that high acidity of cream and high temperatures of cream and butter were primary causes of fishiness. This led to reforms in the treatment of cream and manufacture of butter. Fortunately, the investigations were published in 1900–1904, and the discoveries have since been fully confirmed.

Rancid Taste

This is one of the very worst of taints. It points to advanced deterioration and a low price. Rancidity and moulds are in close alliance. This fact and cleansing the cream of mould by pasteurisation and modern ripening is referred to under the heading of “Yeasts and Moulds.”

Rancidity is one of the hidden flavours, that is, it may be in the produce, but is not detected by the sense of taste. By carefully examining the breath of the butter, it is found in the very early stage.

TEXTURE OF BUTTER

Butter fat is the seed-bed of flavour.

Smooth and Waxy

Butter made from the cream of cows of the Channel Islands breeds has a reputation of being waxy and smooth of texture. Waxiness is chiefly associated with the fat content, and there is evidence that the texture of Siberian butter is unsurpassed in the world.

Firm and Close

When ironed, the texture is firm and close throughout. The uniformity is perfect, as it must be in butter of special or superfine quality.

In cold storage experiments with butter, the author has taken careful note of the firmness and softness of individual boxes and casks after thawing. Some butters with the characteristics of first-grade quality at the time of storage lose their solidity during chilling and develop a bodyless texture, which is quickly detected by feebleness under the iron (trier). It is known that poultry of poor quality do not freeze solidly, and this may be profitably applied to butter.

It may be repeated that a harvest of knowledge awaits cold storage investigation. We know that

enzymes hydrolyse fats into glycerol and fatty acids, and there are enzymes which split proteid matter. Peptonising organisms known as liquefying bacteria have not been closely studied at low temperatures. Those attending to food supplies in cold stores possess information that the research scholar and the dairying industry could greatly profit by.

Heated

The influence of external temperatures causes a softening of the fats, the injury usually being greater on the outside of the butter. But it is possible for the injury to be greater in the body of the butter following high temperatures which are continuous. For example, a temperature of 60° F. for a fortnight would do irreparable damage to the heart of a box or cask of butter, whereas a temperature of 70° F. for a brief period would chiefly affect the outside of the butter.

Severe heating gives to the texture of butter a granular condition readily detected by the palate.

Heating of the texture is most damaging in the case of weak-bodied butter containing a high percentage of curd.

Oily

Fat retains heat longer than the other solids of milk ; cream is, therefore, more difficult to cool, owing to the high percentage of fat which it contains. For example, if cream, after cooling, registers 50° F., the actual fat content would show a higher

temperature. Churning the cream before it is properly cooled is, therefore, liable to cause an oily texture in butter and a loss of fat in churning. A similar fault in butter is attributed to heated cream.

Strong and Stout

When the texture shows closeness and strength, it may be described as strong or stout. Such a texture has wearing qualities, that is, it will withstand tear and wear in transport and show least damage by high temperatures. This class of butter is much desired by blenders for mixing with weak-bodied butter to give character to the finished product.

Loose

Underworking and bad packing gives a loose open texture.

Weak

A weak taste throws light on the texture. Butter-makers should study carefully the constitution of their butter and treat it accordingly. This takes us to the subject of district, whether mountainous or low-lying and flat. Needless to add, weak butter is injured by high transport temperatures more readily than butter of stout texture.

Dry, Hard and Brittle

During the cold season of the year hardness of butter is often a complaint, and a number of practical

investigations to determine the cause have been conducted by the author.

In certain butter producing centres it is found by experience to churn cream at an exceedingly low temperature, owing to the peculiar physical properties of the product.

A low percentage of water usually accompanies a hard texture butter. In the analyses of six samples, four of which were hard and two decidedly softer, the water content was as follows :—

Hard butter : 6.153 per cent., 7.323 per cent.,
7.834 per cent., 7.981 per cent.

Soft butter : 10.761 per cent., 10.832 per cent.

The density of the samples was taken and a complete fat analysis made. The hard butters were shown to have a higher melting point and a higher percentage of hard fats than the soft samples.

One of the characteristics of blended butter is its soft texture, which is much appreciated by consumers. This is brought about by the crushing and mixing of the butter. The moisture which it contains is in a finely divided state and does not show readily on the iron (trier).

Observations made by the author show that the solidity of butter is influenced by the climate and soil and the variety and ripeness of herbage ; also the period of lactation of cows plays an important part. Maize, bean and pea meals and dry fodders harden the texture of butter.

Milky and Cloudy

When butter has a milky appearance it illustrates an error in manufacture. Mistakes, however, are not always to be attributed to the buttermaker, as it frequently happens that the condition of the cream and the temperature of both cream and washing water cause a high percentage of buttermilk to be retained in the finished product. In churning over-ripened cream before the temperature of the fat has been sufficiently reduced, difficulty is met with in getting rid of the buttermilk, and this danger is increased with overheated cream. To obtain a thoroughly cooled condition in the cream, the whole body should come under the influence of the cold in the ripening vats, and with a gradual lowering of the temperature the constituents of the cream will be more equally affected. A low churning temperature is strongly recommended.

The action of buttermilk on the flavour and keeping properties of butter is very marked. Fermentation takes place rapidly when the butter is not refrigerated, and the good flavour disappears.

Probably the principal cause of milkiness in butter is insufficient washing. Before removing the butter from the churn to the worker, the last washing water should show practically no discoloration when drained off.

Churning under-ripened cream increases the difficulty of washing the butter, as the want of acid

leaves a stickiness in the cream ; in other words, it is more difficult to separate the globules of fat from the milky or caseous matter.

It should be in the interest of creameries to make regular tests of the proportion of curd, and when found high, the cause should be immediately looked for and removed.

The following are percentages of curd in butter given in a report of the British Ministry of Agriculture :—

Country of Origin.	No. of Samples.	Range of Curd.		Average per-centage of Curd.
		Lowest per cent.	Highest per cent.	
Germany . . .	5	1.03	1.39	1.18
Belgium . . .	6	1.04	1.38	1.15
Denmark . . .	20	0.78	1.51	1.14
France . . .	41	0.44	1.86	1.11
Holland . . .	62	0.74	1.53	1.11
Sweden . . .	21	0.81	1.46	1.11
Uddenlandsk Butter from Denmark . .	41	0.61	1.48	1.10
Russia and Siberia .	102	0.43	1.64	1.08
Australia . . .	32	0.54	1.34	0.82
New Zealand . . .	27	0.48	1.36	0.77
Argentine . . .	8	0.40	0.94	0.64

Overworked Texture

Considerable quantities of butter show damage caused by overworking. Overworking, greasiness,

stickiness, and oiliness are in relationship. A low moisture content of butter is associated with severe working, and attention is directed to improvement in the construction of workers, and particularly to the rollers used.

Fatty

Soft butter fats, heated cream, and high churning temperatures combine to cause a fatty texture, and this condition grows with the age of the butter. Also, the injury is increased if the storage temperatures of the butter are high and fluctuating.

Care should be taken not to confound a fatty with a heated texture.

Greasy and Sticky

Butter with a good body and texture stands up well to high temperatures. Butter weak in body breaks down. But in dealing with greasiness and stickiness of texture one must go back to the cream supply. Weak cream, namely, cream that is fatty and heated, if churned in this condition, will produce a soft bodyless butter, readily injured on the butterworker, and which is interpreted as greasiness.

Again, if butter, not necessarily weak, is overworked on a table with old-fashioned three or four-fluted rollers, a greasy or sticky texture may readily result.

Greasiness is responsive to high transport temperatures, and is a prominent link in the chain of defects in which temperature plays a leading part.

COLOUR OF BUTTER

Uniform

A hard-and-fast rule cannot be adopted on the question of colour, as certain consuming districts in Britain favour a pale colour, others prefer a brighter straw. Danish butter is light straw, and the chief demand for the butter is in the north of England and Scotland. The colour of Danish butter, like the flavour and texture, is uniform throughout the year, while butter from another country will vary from a straw to a deep yellow.

The shade of colour best adapted to the requirements of the particular market should be the chief aim of the manufacturer.

Pale and White

Breed and food of cows and season of the year act on the colour of butter. Winter butter may be practically white. Certain additions to the food of cows in the winter months will deepen the colour of the butter ; salt also increases the colour.

The addition of colouring matter, such as Annatto, prepared in oil and added to the cream in the churn at the beginning of churning, is recommended. It is of interest to observe that paleness is increased by

the influence of daylight on cream and butter, and by overworking the butter.

White Specks

Cream of low density, when allowed to stand, will separate, the skim milk gathering at the bottom of the vessel. This will coagulate, and when the cream is discharged the particles of casein get broken up, and on churning the cream, become more finely divided.

Small specks in butter are also caused by pasteurising over-ripened cream and cream of low density.

Dull

With aged and also with heated butter a dullness is often seen, and by the use of inferior colouring matter a dark shade which develops on exposure may result.

Two Opposing Colours

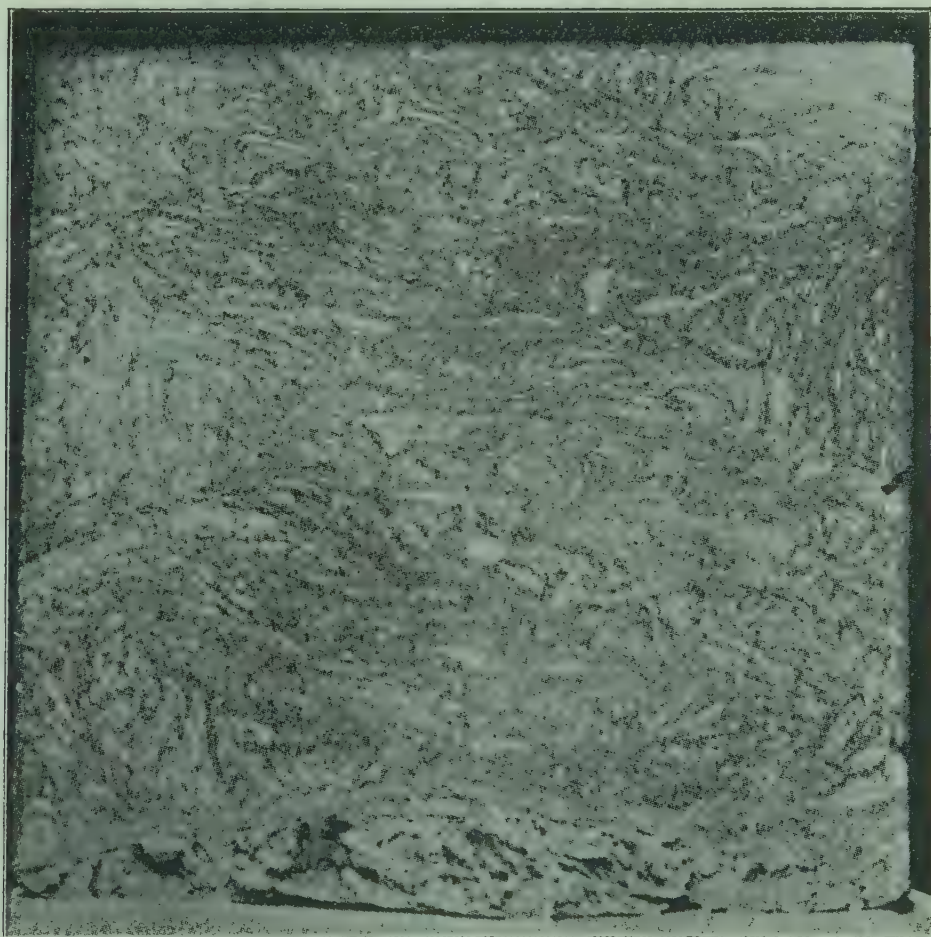
Instances occur of boxes and casks showing two quantities of butter of different shades of colour. That the two butters are entirely different is proved by the difference in flavour and taste.

Irregular

This may arise from want of care in working, or that a large surface of butter has been exposed too long to the air before packing, and, also to supplies of cream which vary considerably in consistency or fat content.

Irregular colour may follow the mixing on the worker of different small churnings of butter and in carelessly packing different churnings in the same box or cask.

The practice of separating cream into a container, whereby layers are formed which represent



Streaky Butter, as photographed from 56-lb. block.
(Sutherland Thomson.)

various quantities separated, and by not stirring the cream after each separation is wrong. Such a practice cannot fail to adversely affect the colour of the butter, as well as the flavour and the texture.

Streaky

Streakiness is prevented by using high-grade salt, carefully sifting it on the butter and thoroughly working it into the body of the butter. This defect has greatly decreased of recent years and is little seen in the export butter of some countries.

Also, the use of modern butterworkers has contributed to its absence.

SALTING

Fixing the Flavour

Buttermakers and cheesemakers clear the field in cream and milk for the sowing of the pure lactic germs contained in a starter. The same applies to salting. A clean field is obtained for the choice delicate flavour characteristic of unsalted special or superfine butter, and to give extended keeping properties to the butter the flavour requires fixing. By the addition of salt and *suitable* storage temperatures this is done. In unsalted butter the flavour is loose. The strength and purity of salt and the purity of the flavour of the butter determine the amount of salt to add. This is of vital importance. If excess of salt is added, the choice delicate flavour is injured.

The percentage of sodium chloride and the absence of impurities in salt are factors which call for earnest attention. Salt of outstanding quality containing over 99.50 per cent. of sodium chloride must be used intelligently, otherwise a bitter flavour may be given to the special or superfine butter. 0.5 per cent. of salt in choice butter (not added to) may be quite sufficient for the fixing of the flavour.

The author's observations show that considerable quantities of the finest butter imported into Britain are over-salted. No butter should have a salt content of over 1 per cent., unless the increase is to meet specific market requirements. In centres preferring heavily-salted butter the assistance of the trade should be sought to discourage it.

With more perfect refrigeration of butter, evidence in support of less salt will be obtained, and at this stage one can safely imply that the lower the cold storage temperature, the less salt is necessary.

With greater restrictions in the use of boric acid in butter, the addition of more salt may be anticipated. This will be in error, just as it is wrong to heavily salt butter which is made from inferior or "off" quality cream. It helps to fix and preserve the bad taste.

It is recommended to carry out experiments in the salting of butter, which is a simple matter. It is difficult to understand how countries go on losing money and do not experiment, particularly when every facility can be obtained to carry out work of permanent value.

Uneven

Care is required to distribute the salt properly on the butter during working. "Pockets" of salt are commonly found in boxes and casks, also patches of undersalted butter showing the extent of unevenness.

Excessive salting has already been referred to.

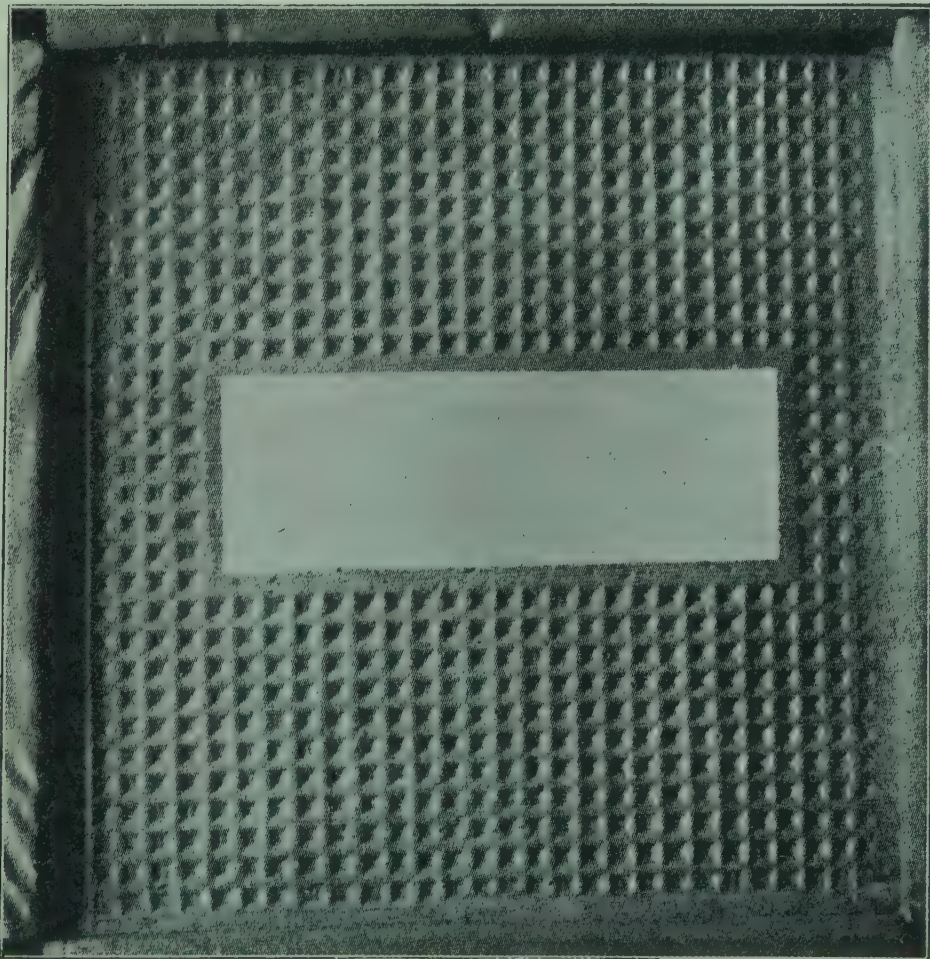
Undissolved Salt (Gritty)

Inferior salt and large-grained salt melt and distribute in butter with difficulty, causing a grittiness.

FINISH OF BUTTER

Poor Finish

“Poor” is the equivalent to careless, and, generally speaking, finish demands careful attention.

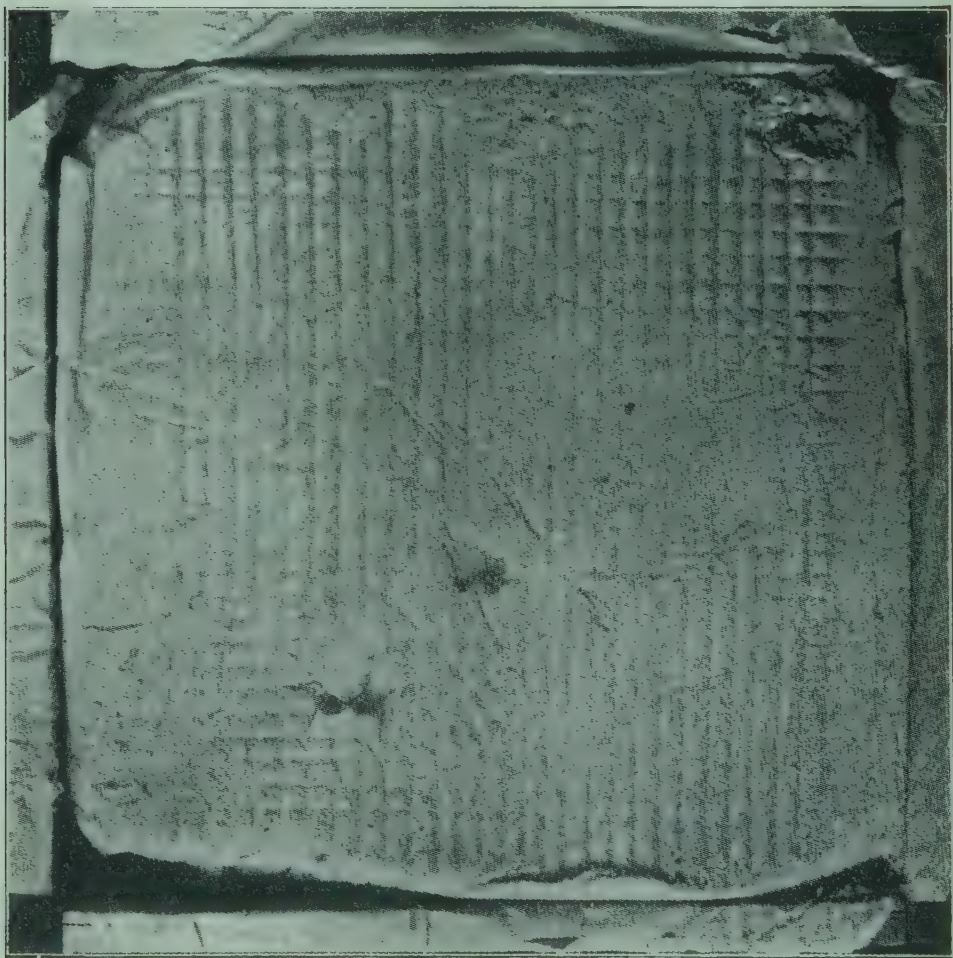


Well-finished Box of Butter. Clear space is for the factory brand.

When one considers that buyers look at the open box or cask before purchasing, a picture of poor finish influences the judgment. First sight is, un

fortunately, lasting in the minds of some buyers. A neat and tidy finish is an invitation so to speak, and this is given by the buttermaker to the merchant ; it has at once a pleasing effect.

The author has seen butter of beautiful quality



Badly-finished Butter.

ignored by buyers simply because the appearance of the butter was not inviting, and, consequently the iron never operated on the good quality.

It has been noted on various occasions that poor quality butter has been better finished than choice quality butter. A determined effort should be made to finish off every box or cask attractively, not with



Badly packed and short-weight Butter.

the object of trying to mislead in the quality of the butter, but as a correct commercial policy.

Heated

Buyers have an interesting habit of sampling the top surface of butter for a heated condition and for taints. The result may influence the price.

Judging butter from the surface and sides of casks cannot be ignored by buttermakers and exporters. Graders should sample the butter more frequently from the side of the wood as well as the surface and centre of the cask.

Mouldy or " Spotty "

When a box or cask is opened, nothing is more objectionable to the eye of a prospective buyer than the appearance of mould. It at once detracts from price, as stated elsewhere.

The practice of scraping butter and touching it up before exposure for sale is commendable, but it certainly cannot be enforced under all import conditions.

Parchment

Stout parchment of good vegetable quality is vital for various reasons. First, to protect the butter against external influences, heat and dirt ; secondly, to attract ; thirdly, to keep evaporation down ; fourthly, to more thoroughly protect the outside appearance of boxes and casks against staining by moisture.

Further, with poor parchment the surface of the butter frequently absorbs mouldy and other taints. These penetrate the parchment, and may penetrate the whole body of butter.

With defects in the quality of boxes or casks such as arise from knots and unseasoned wood, inferior parchment offers little resistance. Numerous examinations of parchment conclusively prove that it should be bought on analysis. Much parchment in use at the present time is impregnated with moulds, which is a very fertile source of contamination of butter. With standardisation of boxes, casks, salt, and parchment the advantages would be far-reaching.

Following is an analysis of an expensive sample of vegetable parchment paper :—

“ *Porosity Test*.—Time taken to force 25 cubic inches of air under a standard pressure through the dry paper : Twenty-five minutes.”

“ *Oil Penetration Test*.—Under a 3-inch head of olive oil, temperature 15° to 18° C. : Five spots.”

“ *Water Penetration Test*.—The sheets were immersed for ten minutes in 1 c.c. of water : Penetration obvious.”

“ *Bacteriological Examination*.—The paper was badly contaminated ; moulds uncountable.”

Boxes and Casks

The quality of the wood and finish contribute to the appearance of boxes and casks of butter. Boxes which show both sides planed are commendable.

Wood should be flavourless, thoroughly seasoned, and free of knots. For casks, beechwood is probably the best to use. Paraffining of the inside of the wood can be recommended. This reduces the risks of mould from the wood. Seams should be close and bands secure.

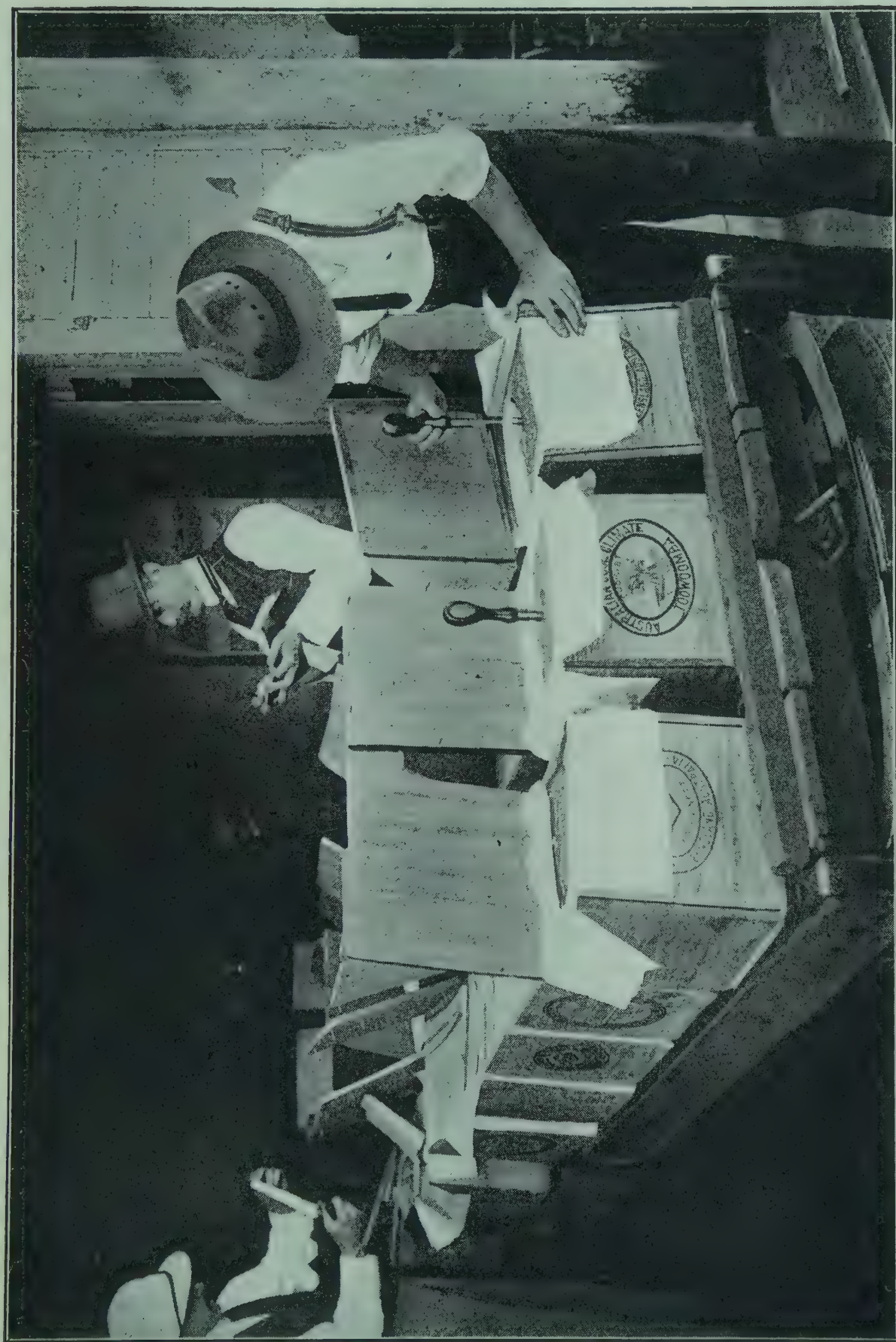
Boxes and casks are guardians of the quality of butter, and this fact should commend itself to the whole industry.

The scarcity of safe flavourless wood is causing concern in some exporting countries. Cheaper wood, such as white fir, can be used, but care must be exercised in the quality of parchment and wrapping. Only parchment which can pass the necessary tests is recommended, and the wrapping, which is a specially prepared material coated with preserved wax, makes contamination of the butter with a woody taste and external mould practically and scientifically impossible.

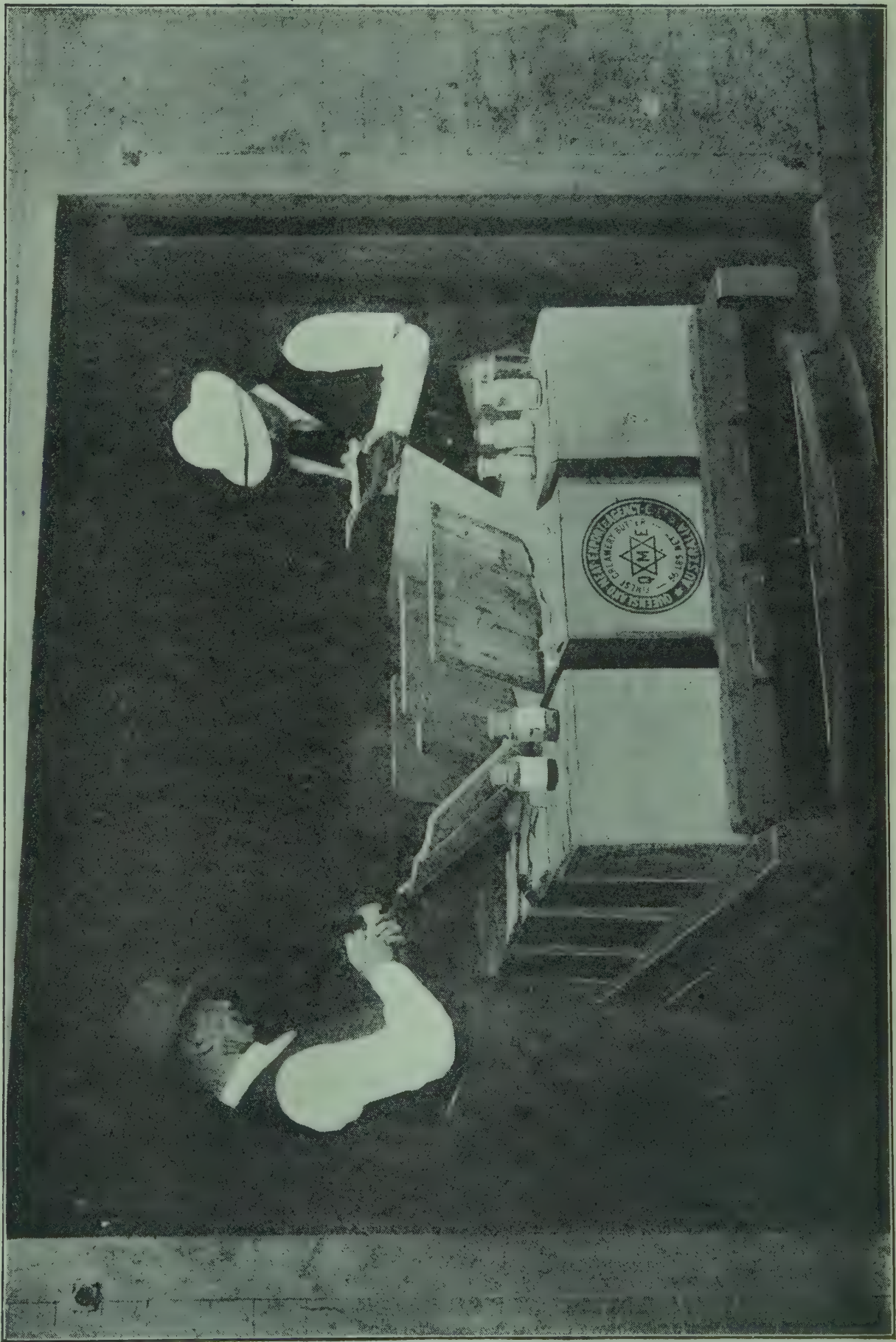
Economy in the weight of the wood also can be made by the use of the improved wrapping, and the gain not only applies to the quality of the butter, but there is decidedly less shrinkage through evaporation of butter moisture. A further point in favour of the wrapper is the clean appearance of the butter when opened out.

Stencilling

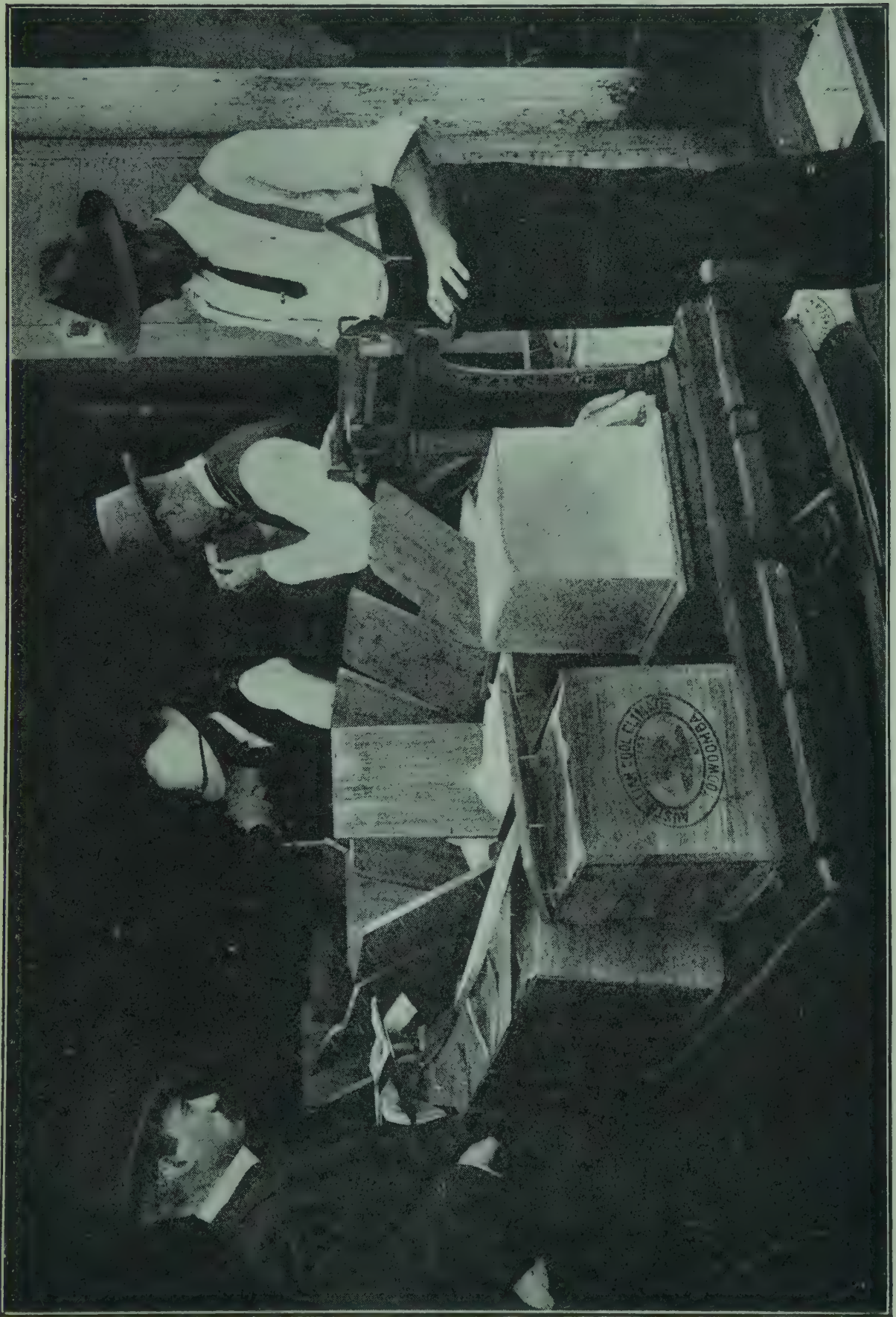
A neat, clean box or cask of butter speaks for itself, and it carries more approval if accompanied



Taking Temperatures previous to Sampling.



Taking Samples for Chemical Analyses.



Checking the Weights.

by attractive stencilling. The combination conveys a feeling that the butter is likely to be creditable.

Indelible marking, few marks, and uniformity are recommended. Very efficient machines can now be had for stamping and marking boxes and casks.

CHEESE

As grading is the basis of this publication and the two to follow, it is only common courtesy to refer to the State of Queensland as the first in the Commonwealth of Australia to put a grading Act on the statute book. Queensland's sister states, namely, New South Wales, Victoria, South Australia, and Tasmania, recognised the great value of the Act by adopting a similar compulsory system, to be succeeded by Commonwealth grading, which was presided over by a former Dairy Expert, Mr. M. A. O'Callaghan. Other countries in the Empire, also foreign countries, have introduced grading, and also, there is some reason to feel that the good example of Queensland will be repeated in the Argentine Republic.

Practically all far-reaching dairy reforms in Australia, including certificated cream testing, accurate and standardised glassware, sprung from the Queensland Law and Regulations. The author will deal with the early history of grading in a later publication announced on p. 96.

The principal variety of cheese consumed in Britain is Cheddar, and the chief overseas sources

of supply are New Zealand and Canada. In both these countries grading and marking are carried out with efficiency.

In Britain the manufacture of Cheddar and Cheshire cheese is an industry of some magnitude ; also other varieties are produced, as Derby, Lancashire, Leicestershire, and Wensleydale. No grading has so far been attempted in Britain, but there is a movement to introduce a system.

It is estimated that the total manufacture of cheese in Britain is about 100,000 tons. That Cheddar cheesemaking will continue to develop to any great extent is doubtful, New Zealand and Canada being able to put on the home market a high and uniform quality of cheese at a lower price than is obtainable by home production ; also, continental varieties of cheese are claiming greater attention each year. A comparison of the following varieties of cheese from a restaurant menu with that of ten years ago is evidence of the change :—

Cheddar, Gruyère, Roquefort, Gorgonzola,
Kraft, Camembert, Bondon, Cream. .

We are told that the world produces some 300 varieties of cheese, and new ones are added annually. If we examine those chiefly in demand, evidence will be found that the public taste is changing and should be carefully watched.

Let the principal classes of cheese be stated, with varieties mostly in use in Britain.

Hard Pressed Cheese

Correctly speaking, Cheddar is the only *hard* pressed cheese manufactured in Britain, with Gruyère as the principal imported variety.

Pressed Cheese

Cheshire, Derby, Lancashire, Dutch.

Varieties coming under these two heads are ripened chiefly by enzymes, and rennet plays a very important part. It is permissible to repeat that moulds are a source of danger, more particularly to the pressed varieties, which do not exclude air so effectively as Cheddar cheese.

Pasteurised Cheese

Kraft.

Blue-Veined

Stilton, Wensleydale, Roquefort, Gorgonzola.

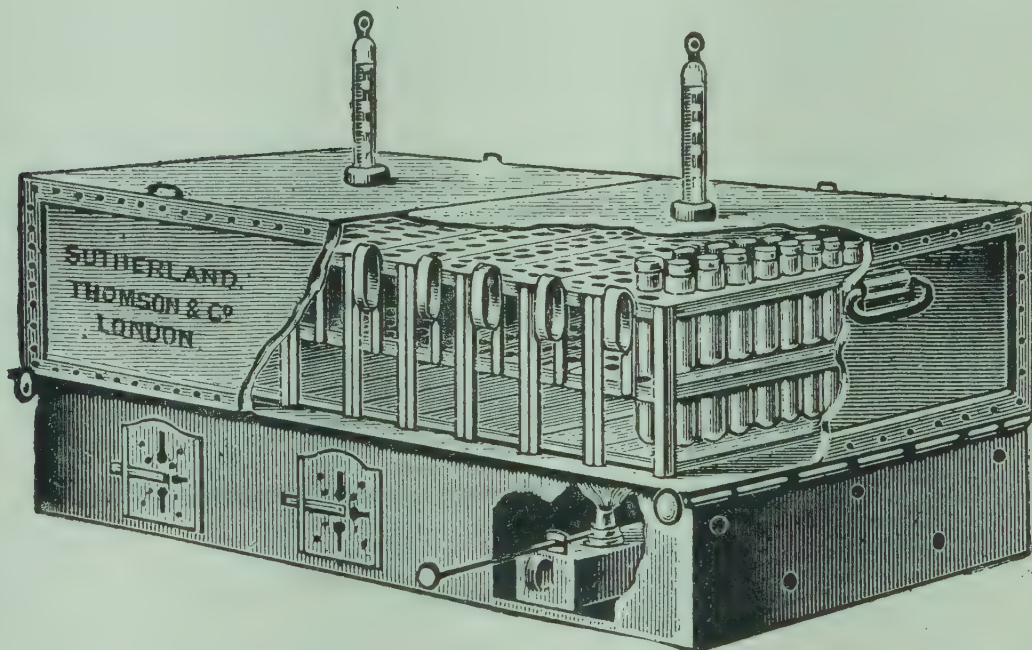
Soft Cheese

Camembert, Bondon, Brie, Cream.

Milk Supply

Like the manufacture of butter, the first care is the milk supply, but as cheese is produced direct from milk, the subject claims closer attention. The reductase-fermentation test is specially valuable, as it throws a clear light on all supplies which are contaminated with gas-producing bacteria commonly found in cow manure and dusty cowsheds. Yeast-infected milk, also very destructive, is clearly illus-

trated by the test. Contaminated supplies should not be mixed with clean milk in the cheese vat. There should be no outstanding difficulty in grading suppliers' cheese-milk on a basis of purity. When the grading of milk (by the reductase test) for consumption in the raw state was initiated in Finland, four classes were enforced; now only two are required, so great has been the improvement.



The Reductase Test, showing Tubes.

Blended Milk

Very careful observation by the milk grader is necessary with so much mixing of milk for cheese-making, and the following terms may be sufficiently descriptive of his supplies: "New," "Sweet," "Whole," "Raw," "Fresh," "Pasteurised." But milk is found in various conditions, and the author herewith gives his own terms and explanations:—

Sleepy.—This condition may follow milk that is confined at a low temperature in open vessels exposed to an atmosphere that has not been ventilated.

Suffocated.—If warm freshly-drawn milk is put into churns, the lids shut down, and the milk refrigerated, it will develop a characteristic flavour and odour, which may even be detected after it is mixed with a fresh high-grade quality.

Dead.—When insipid-flavoured milk is refrigerated it becomes dead.

Soft is the product of a district of rich soil and heavy rainfall, causing a false maturity in the food of the cattle; also where the climate is “weak” softness in the milk may be looked for.

Hard.—A product of a district having conditions the reverse of those just given.

Loose is a term that may be used to describe the mixed milk of various breeds.

Starter milk is that which is advanced in acidity and continues active.

The mixing or blending of these milks cause difficulties in cheesemaking, and in addition one has to consider fat variations and total solids and other differences. Again will the cheesemaker turn to pasteurisation as the best available remedy for ills over which he can exercise little control.

STANDARDISING CHEESE

Fixity of flavour, which may be termed the premier subject of manufacture, equally applies to Cheddar and other varieties of cheese as it does to butter.

Results in New Zealand show what can be achieved. Pasteurisation of the cheese-milk is now general, and grading statistics of cheese as a guide to progress cannot be over-estimated, as shown by the following figures of one month's grading of New Zealand export cheese.

Factory.	Grade Points Awarded.	Crates passed as First Grade.	Crates passed as Second Grade.
Rukuhia . .	92·52	359	—
Aka Aka . .	92·49	584	—
East Tamaki . .	92·46	412	—
Manawaru . .	91·89	1,333	—
Matatoki . .	91·77	357	—
Gordonton . .	91·75	552	—
Hairini . .	91·74	351	23
Eureka . .	91·55	561	—
Wharepoa . .	91·59	281	—
Shelly Beach . .	91·38	578	—
Hikutaia . .	90·92	325	17
Matamata . .	90·32	1,640	81
Huirau Road . .	90·19	392	—
Orini . .	88·59	289	92
Kiwitahi . .	88·02	156	64

Pasteurisation has advanced farther than has been anticipated. It is being applied to the finished article, and a standardised cheese known as Kraft is extensively marketed. This is very important, and the manufacture of the cheese will be dealt with later. Pasteurising cheese-milk removes many dangers and increases the weight of the cheese, particularly if the pasteurising temperature is high. Inoculation of the milk with a pure culture actively combines with the high temperature against mould attacks. The big three are Temperature, Pure Culture, Pressure.

Cheese Imports

At this stage it is well to give figures showing the extent of trade with Britain. Increases by New Zealand of pasteurised (standardised) Cheddar cheese, Holland of Dutch pressed cheese, and Italy of Gorgonzola cheese, each have a lesson for the industry :—

From	1922.	1923.	1924.
	cwts.	cwts.	cwts.
Holland . . .	175,761	207,024	144,025
Italy . . .	40,256	104,895	137,881
United States .	21,998	40,869	18,110
Australia . .	99,720	40,370	46,785
New Zealand .	1,294,779	1,368,654	1,479,842
Canada . . .	949,042	1,001,612	1,005,985
Other countries	77,789	75,122	56,831
Total .	2,659,345	2,838,546	2,889,459

Green Cheese

Very stringent regulations are necessary as to the age of cheese for export. Graders should be fully empowered not to grade cheese when too green, otherwise serious errors are sure to arise. A cheese must be set and its future quality, so to speak, established at the time of grading. Managers of cheese factories and also cheesemakers should, in their own interests, insist on precautionary measures. Careless makers and those temporarily employed or migratory are not always loyal to grading, because grading is the severest analyst of their capabilities and usefulness in the cheese factory. Any injustice they are found guilty of should be met by a fitting punishment.

It is suggested to withhold as occasion arises samples of cheese for control purposes.

Grading Outfit

As with butter a set of "Hislop" irons, supply of muslin, small sample bottles and an entry book are generally all that is required.

HOW TO CLASSIFY

Cheddar Cheese

A review of the features and defects in the chief varieties of cheese are dealt with later, to which the attention of readers is directed.

The rind is carefully examined for weaknesses which reflect on the quality of the cheese, and particular note is taken of the colour. From the top, bottom or side of the cheese a sample is taken with a thoroughly clean iron and immediately brought under the nose to search the aroma or smell ; afterwards the sample is pushed to the point of the iron leaving at least an inch clear of the metal. This is broken off, preferably in two parts ; one is crushed between the thumb and the forefinger in examination of texture, and the other is searched for flavour or taste. Systematically and without delay, aroma, smell, flavour, taste, texture, colour and finish of the cheese are examined, and points awarded and defects noted.

Fat Content

A standard for fat should be fixed for all varieties of cheese. This would go far to raise the quality and bring about uniformity and standardisation. Certain defects in cheese are directly attributed to a low fat

content, also a fat standard would have a good effect on the general milk supply.

In a practical estimate of the richness of cheese, flavour and texture may easily mislead the grader, as the experience of the author shows. A Cheddar cheese which has been overcooked and overdrained may give marked indications of a dead flavour and a dry, thin or fatless texture, which may readily cause the grader to consider the cheese partly or largely skimmed. Again, the cheese may be sweet and tough or over acid and over salted, each influencing a texture suggestive of skimmed milk. In all instances of dead, flavourless Cheddar cheese a fat analysis should be made. The author has proved many times that the flavour, consistency of texture, and colour are dangerously misleading on the question of fat content.

Cheshire

For this variety of cheese, also Lancashire, Leicestershire, and Derby, a different size of grading iron (trier) is required, and should be carefully selected.

This cheese has different characteristics to Cheddar, following differences in the methods of manufacture. It is generally made for quicker sale, and may be put in a class with Lancashire and Leicestershire cheese. It does not follow that Cheshire cheese cannot be manufactured to keep. The author has graded makes of Cheshire cheese of choice quality

which were not under nine months old. The average Cheshire cheese is cooked at a low temperature, acidity is kept low compared with Cheddar, also it is not so severely pressed, which limit the keeping properties.

Lancashire

The making of this cheese is purely local, being confined to the county bearing its name. It is of a rich full-cream quality, and much care is required in grading, which applies to all varieties of cheese of the Cheshire, Lancashire, and Leicestershire class. The body of Lancashire cheese is not so robust as Cheddar, more resembling Cheshire.

Like Cheshire, the rind of the cheese is distinguished by freedom from mould.

For toasting purposes Lancashire cheese is particularly well suited, as it softens readily on heating.

Gruyère

This is a Swiss cheese, which is characterised by its great circumference and the large eyes or air spaces. Gruyère varies in the fat content, and this may be detected in the practical examination of the cheese. A rich, fat Gruyère has a more mellow flavour and the texture is meaty. It is recommended to test the cheese for fat.

Blue-Veined Cheese

The principal moulds in the ripening of cheese appear under two groups, *Oidium Lactis* and *Penicillium*.

Varieties of cheese ripened by the *Penicillium* group are Stilton, Roquefort, Gorgonzola. It is important to note that these cheeses do not ripen from the outside like varieties in the soft class of cheese.

Stilton

Stilton, like Gorgonzola, is made from sweet and acid curd, but with the former artificial "colouring" with mould is not yet practised. The demand for Stilton cheese is probably decreasing on account of the heavier imports of Gorgonzola and Roquefort. But Stilton is regarded by prominent judges of blue-veined varieties of cheese as the finest example of that class, the flavour and aroma being considered more delicate. Stilton may be divided into well coloured and slightly coloured sub-classes.

In grading Stilton, Roquefort, and Gorgonzola a special "Hislop" iron of small bore is used. Much care is taken when drawing the sample. The colour of the cheese is an outstanding feature, and must be carefully examined.

Roquefort

Of recent years the marketing of Roquefort cheese in Britain has considerably increased. Two reasons may be given for this: change in public taste, promoted by an increasing influx of British visitors to the Continent, where Roquefort cheesemaking is a staple industry, and, consequently, the better catering for this variety of cheese in Britain.

Secondly, Roquefort cheese usually took months to ripen ; now it takes a few weeks. This is brought about by dusting the raw curd with specially-prepared mould.

Denmark has entered into competition in the manufacture of the cheese and is now a considerable exporter to Britain, which has contributed to a reduction in the price. In South Africa, Roquefort cheese is successfully manufactured, and the author has examined in London African Roquefort cheese of perfect quality. The flavour and aroma of Roquefort cheese are produced by the action of the mould on the fat of the curd, that is to say, it is hydrolysed. With a view to increasing the fine flavour and aroma, milk exceptionally rich in fat is used, which applies to all blue-veined varieties of cheese.

The flavour should be delicate and attractive. If there is an excess of mould, it becomes too heavy, and the keeping properties of the cheese are endangered ; also transport over long distances is made much more difficult. The application of low cold storage temperatures readily ruins the quality of this variety of cheese.

The distribution of the blue colour should not be too patchy.

Roquefort may be found discoloured, which is frequently caused by contamination following pricking the cheese. If the surface is not kept properly clean, injurious moulds and bacteria will enter with

the needle ; also this applies to Gorgonzola cheese. Pricking is done to allow the passage of air, which is necessary to the proper growth of the mould and hydrolysis of the fat.

Gorgonzola

This cheese has also increased in sale in Britain, and Italian export figures have risen very considerably during the last five years, as shown on a previous page. There appears to be more Gorgonzola cheese consumed than Roquefort and Stilton together.

Artificial ripening again plays a principal part in increasing the manufacture and in reducing the price. The same mould, namely, *Penicillium Roquefortii*, is used in the ripening of Gorgonzola, as in Roquefort. The cheese is more compact than Roquefort and requires less oxygen or air for ripening and coloration.

Compared with Roquefort, bitterness is more frequently found, which may be due to contamination of the curd by liquefying bacteria and by keeping the cheese at too low a temperature. Also, over acidity is not an uncommon defect.

Gorgonzola, like Roquefort, should have a high fat content, so necessary to a fine flavour and texture.

Wensleydale

The first thing to look for in grading Wensleydale cheese is the marks of the stitches down one side of the cheese. These should be clearly visible, showing good bandaging. In the absence of stitches, a dry

and over-acid cheese is looked for with faulty veining. Mites are a cause of considerable damage ; they enter at the ends, where there is no bandage, and work their way into the cheese. The coat of a Wensleydale is different from that of a Stilton and is not crinkled ; the colour is greyish white, and any discoloration or excessive growth of mould discounts the market value, and there should be no red or black spots. The flavour should be rich, sweet, creamy and moist, and must not be acid or bitter. The texture of a Wensleydale is soft and buttery with delicate blue veining well distributed throughout the cheese.

Open holey cheese are never good.

SOFT VARIETIES

The ripening mould is of the *Oidium Lactis* group and penetrates from the outside of the cheese. For successful ripening a pure clean atmosphere is very essential.

Camembert

The mould grows more rapidly than the *Penicillium* group. The coat of the cheese must be kept clean and not touched by hand, to prevent contamination. With soft varieties of cheese it is the casein which becomes digested, and when digestion is complete the cheese has a liquefied appearance and is soft and creamy.

The coat of the cheese is an indication of quality,

and should not be white, which shows hardness and over-acidity.

Flavour is rich, fatty, and clean.

Texture, thick, creamy ; a hard texture indicates that ripening has been checked.

Colour, creamy. Whiteness and hardness are generally found together.

Cream Cheese

A genuine cream cheese has the richness of flavour and colour of high-grade cream, the only difference being a delicate and attractive acidity of the cheese. Texture should be compact, resembling butter of stout texture. Some cream cheese contain milk curd substitutes, and a test of the fat content is recommended.

Bitterness of flavour is not uncommon, and an important cause is contamination of the cream with yeast, known as *Torula amara*.

PASTEURISATION OF CHEESE

(Kraft)

The importance of pasteurisation and its application to the finished cheese is of more than passing interest. Following is an abstract from a published contribution by S. K. Robinson, of Kraft and Bros., Chicago.

Methods of Preparation

There are different methods in use in the United States to-day. Essentially, preparation consists of grinding the cheese, heating in a jacketed container with agitation, and filling into the proper containers either directly or by specially designed machinery.

Changes that occur when Cheese is Heated

When the cheese is heated, there is at first a slight operation of butter fat, so that the cheese particles appear oily. With more heat the cheese becomes plastic or stringy, and is said to "pull up." Upon further agitation this plastic condition is gradually broken up and a homogeneous mass resembling very heavy cream results, with no plastic properties.

Chemical and Physical Principles involved

During this reheating process conditions are favourable for emulsification. The plasticity of the

casein is probably most important, because it acts as the cementing agent for all the other ingredients.

Not all casein and paracasein bodies are plastic, and neither is the paracasein in cheese always plastic. This depends on the method of manufacture, degree of ripening, and acid development in the cheese.

Blending of Cheese

For the best results, cheese having the desired properties must be blended. This is the surest method of getting reliable results. The pasteurisation always brings out the defects in the cheese.

To get the best results an examination of the paracasein must be made. Also, the finished product desired must be considered.

An analysis is given of a typical cheese that is suitable for pasteurisation :—

Moisture	.	.	per cent.	36.87
Acid	.	.	c.c.	*120
Ash	.	.	per cent.	3.03
Salt	.	.	„	0.35
Lime (CaO)	.	.	„	0.98
Total N	.	.	„	4.27
Water soluble N	.	.	„	0.65
Salt soluble N	.	.	„	3.35
Formal titration	.	.	c.c.	*58

*n/10 NaOH per 100 grams of cheese.

Application of Process to Different Kinds of Cheese

The pasteurisation of cheese has a wide application. American Cheddar, Swiss Brick, Limburger,

and even Camembert cheese have all been successfully treated. There are several exceptions in the soft cheese group, due to certain complex changes in the casein.

The Effect of Temperature and Salts

The temperature is very important and must be carefully watched. Some cheese can stand more heat than others. Certain salts are important, both from the standpoint of effective pasteurisation and proper emulsification. These salts probably act by influencing the electric charges of the colloids.

Scoring of Kraft Cheese

In the plastic state the cheese should have strands about 15 inches in length ; they should not be tough. There should be no free fat or moisture. A noticeable gloss on the cheese is desirable.

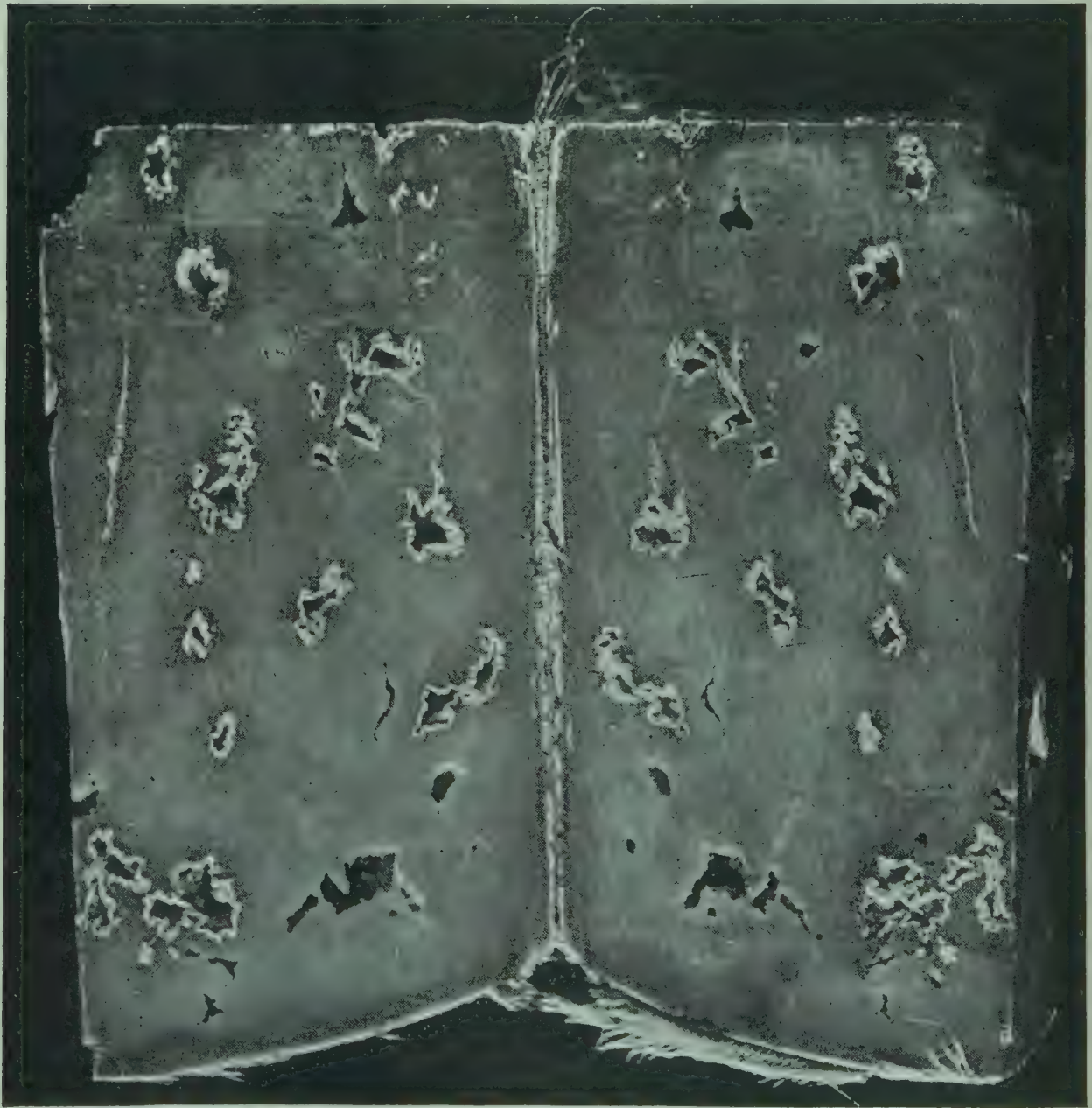
CHEDDAR

“ Loaded ” Cheese.—The manufacture of a high-grade quality of Cheddar cheese can only be maintained by following sound principles and practices. *“ Loaded ”* cheese, that is, cheese made to retain a high moisture content, giving it more weight to the gallon, of milk is usually made for quick sale and early consumption. If kept, dangers of discoloration and other serious defects are considerable.

Good Features and Defects

Flavour.—Rich, clean, and desirable.

Body and Texture.—Smooth, close, firm, fatty, and without holes and fractures.



Showing Cheddar Cheese badly affected with Mould.
(Sutherland Thomson.)

Colour.—Either white, pale or deep, but uniform.

Finish.—No hollowness, no broken edges, good colour, and well bandaged.

Crates or Packages.—Uniform, neat, and made to give free air space to the cheese.



Cultivation of Mould from the affected Cheese.
(Sutherland Thomson.)

Defects

Moulds and Yeasts.—As with butter, moulds and yeasts do far more damage to the quality of hard pressed and pressed cheese than is generally understood. The flavour and appearance of many thou-

sands of British-made cheese are injured annually through moulds and yeasts, and which is often attributed to other causes.

Acid.—Excess of acid in the curd generally gives a pronounced taste of acid in the cheese and a bleaching of the colour. When sampled with the iron, the surface of the cheese is generally found to be rough instead of smooth and bright.

Sour.—This is attributed to bad milk, and also to the curd lying too long in the whey, too low a temperature of the curd after running off the whey, late salting; also chills at critical stages in manufacture. White moulds and incrustations on the outside of the cheese frequently indicate sourness.

Rancid.—This serious and costly taste is not so prevalent in Cheddar cheese as it was before pasteurisation was introduced. Rancidity develops with moulds, and pasteurisation of cheese-milk and the use of active cultures have minimised the defect.

Weedy.—It is pronounced in certain months of the year. At low ripening temperatures of cheese a weedy taste weakens, or it may entirely disappear, but care is required in fixing the temperature.

Bitter.—This taste may follow the growth of the *B. coli* group of bacteria, commonly found in cow manure. Bitterness may also be caused by the curd lying too long in the whey, quick falls of temperature in the cooler and during ripening. When moulds have developed to a certain stage, bitterness is followed by rancidity. Owing to the

hard pressed condition of Cheddar cheese, moulds should not grow, but with a tough curd insufficiently pressed moulds may injure the quality.

Vinegar.—This peculiar taint is attributed to a germ of the micrococcus group, which has the property of curdling milk. Curd affected by this taint invariably contains much moisture. Remedy is, scald higher to reduce the moisture in the curd and develop less acid before milling.

Water Taints.—Stale and tainted drinking water for cows will give a bad taste to cheese. Water containing mineral matter has been proved by the author to be responsible for taints. Cheese made from the milk of cows fed on sewage land has a low keeping quality, and decomposition readily develops.

Colostrum Taint.—Cheese made from supplies of milk containing colostrum has a low keeping property commensurate with the quantity of the colostrum, and an evil decomposition in the cheese frequently results.

Yeast Taint.—Much Cheddar cheese manufactured in Britain suffers from taints produced by yeast, and imported cheese may be found affected. When it is advanced, decomposition sets in and a repulsive smell is given off. During the warm season heaving is a feature of the taint, and the texture of the cheese generally shows ruptures. The *B. coli* also causes heaving, but to a much less extent.

Suffocated Taste.—The author has found a peculiar musty taste in cheese which has been too tightly

packed in the crates ; in other words, the cheese was suffocated. A woody taste may also follow tight crating.

Fruity.—This term is applied to a peculiar taste resembling fruit. It is attributed to an organism. Pasteurisation of the milk and the use of a vigorous culture are recommended as a means of prevention.

Salty Taste.—Excess of salt is not uncommon, and the quality should not be overlooked. Analysis of salt is strongly recommended as a precaution against impurities which may cause bitterness in the cheese. Also, the size and regularity of the grain are important. A larger grain than for butter is necessary to slow melting. With a small grain, too much salt is lost in pressing the cheese.

Texture

Soapy.—Cheese of this consistency shows a pronounced weakness of body ; also soapiness is traceable to bacteria.

Toughness is found in cheese made from curd of low acidity at the time of running off the whey, and the defect is increased by salting too soon.

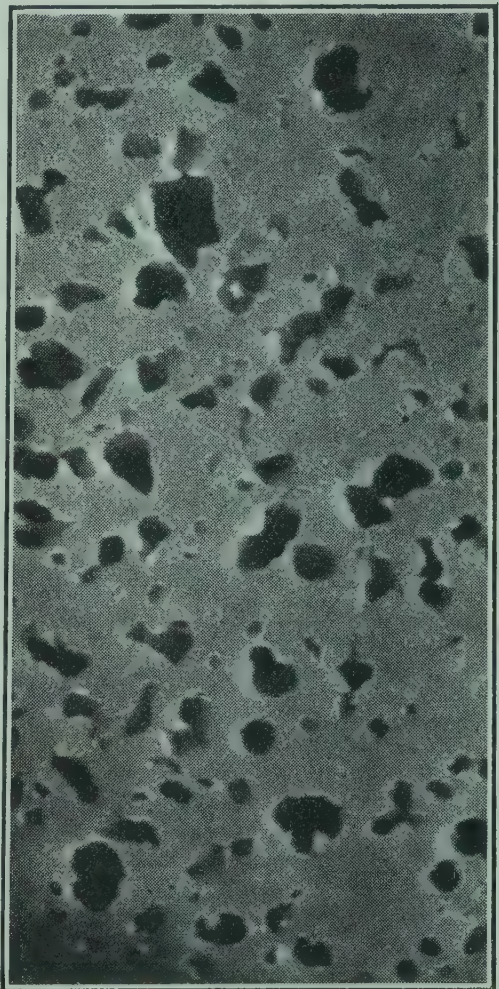
Holey.—This fault has its origin either in milk contaminated with gas-producing germs or in a sweet curd badly aerated and pressed. Round holes found in cheese indicate sweetness. Rugged holes may result from an irregular distribution of moisture and uneven temperature in the cooler causing defective acidity. A sweet cheese is difficult to press, as the

condition of the curd resists pressure. Heavy pressure is desirable, but care must be taken to prevent the cheese heaving in the curing room. To guard against this, do not press at a high temperature, and be careful to gradually apply the pressure, which should reach its maximum at the end of three hours. Particularly note that a sweet cheese is often the result of drawing the whey too sweet and adding the salt in advance of the acidity.

Open-Bodied.—Setting in the whey too soon; draining too sweet; piling matured curd too high.

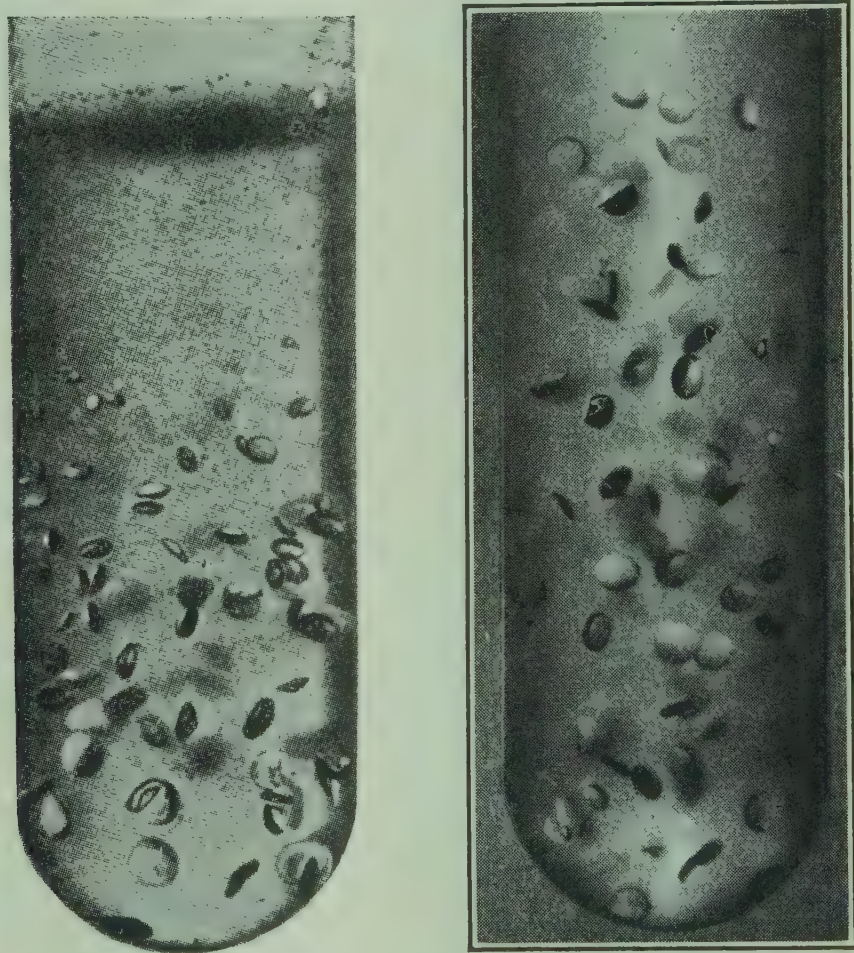
Gassy.—When milk is observed to be gassy, bad smelling, and slow to ripen, it should not be used. With suspicious milk it is recommended to cut the curd finer, stir well with the hand, and scald a little higher. Run off the whey sooner, mat not so deeply, and cut into smaller blocks. Pile in such a way as to flatten the curd.

Weak, pasty cheese follows quick scalding of rich milk, which locks in the moisture.



Cheese made from milk which was contaminated with the "gassy" germs commonly found in the dust of cow sheds. (Sutherland Thomson.)

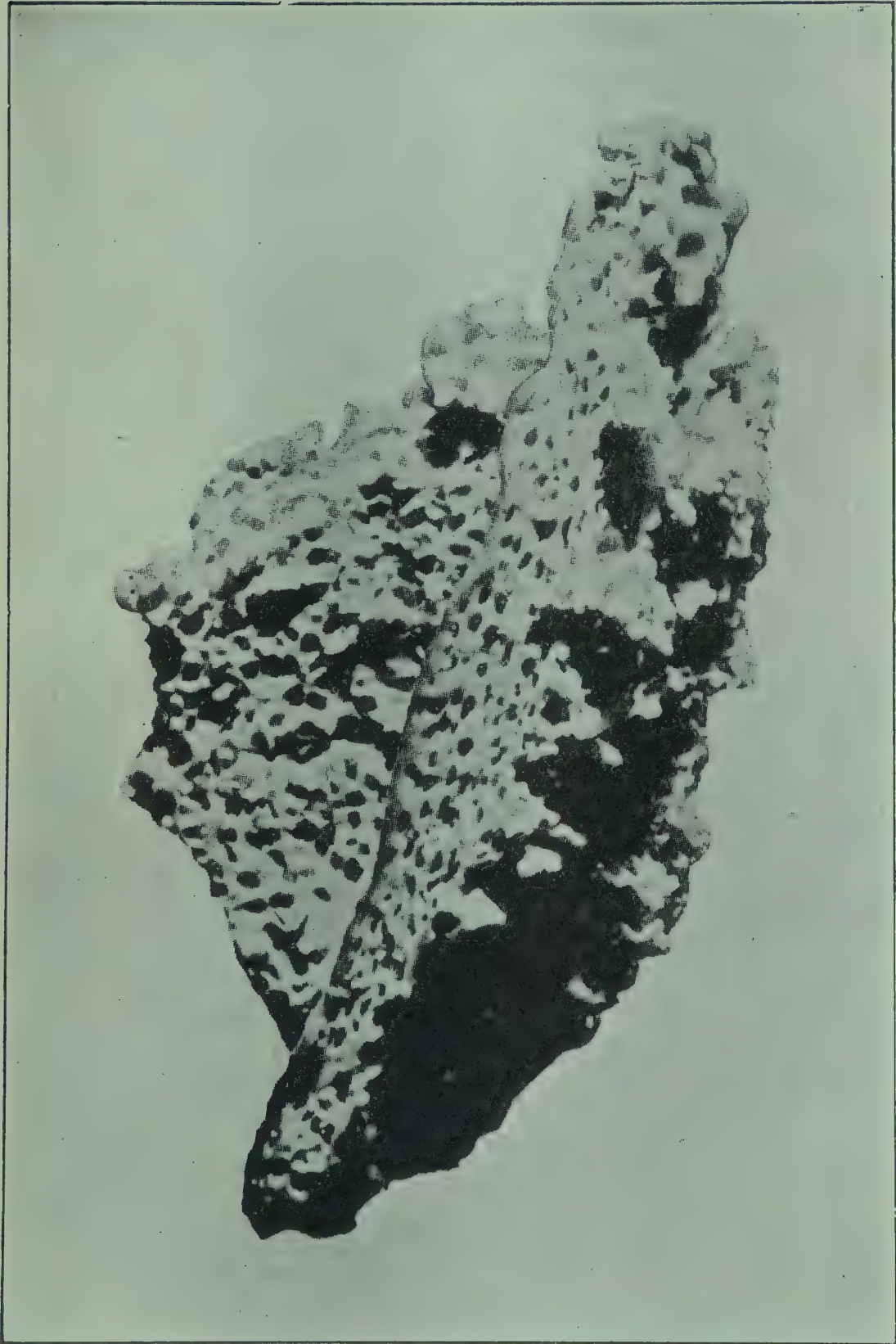
Remedy.—Cut finer and scald steadily to a temperature one to two degrees higher than normal in the autumn and cold months of the year. Pasty cheese is often caused by the curd getting cold in the vat or cooler, producing a check on the acid and



Illustrating the effect of the "gassy" germs cultivated from the sample of cheese. Note the bells of gas produced.
(Sutherland Thomson.)

preventing the escape of moisture. A weak cheese, when paled, gives a swollen plug which cannot be replaced.

Dry, Crumbly.—Too much rennet ; high temperature at coagulation and during cooking ; excess of



Spongy curd from milk inoculated with the "gassy" germs. (Sutherland Thomson.)

acid and salt ; curd hooped at too low a temperature and insufficiently pressed.

Salt.—See Salty Taste.

Colour

High and Irregular.—Some makes of cheese are coloured to excess, and the taste of Annatto may readily be found. Faulty mixing of salt in the curd will cause an uneven colour.

Black Specks

This may be attributed to particles of metal. A sharp look-out should be kept for faulty milk vats and cans.

Black Spot

A light-dark and a blacker coloration in Cheddar cheese may be taken as the intermediate and final stages of the one and same defect. It has a relationship to discoloration or bleaching.

Discoloration (Bleaching)

For years it was prevalent in British-made Cheddar cheese, and by the use of starters, improved methods of manufacture, and more education to suppliers it practically disappeared. The defect seems to have returned, as many affected cheese are seen in the windows and on the counters of retail shops. Discoloration is a deadly defect. It not only affects the quality of the cheese by a form of decomposition,

but the appearance is often very objectionable and uninviting. The term “discoloration,” therefore, detracts from the seriousness of the defect. Differences of opinion exist as to the real cause. Investigations have been conducted recently at the instigation of the author, in London and Copenhagen laboratories and by highly competent research scholars, with the result that causes of discoloration have been found.

The following preventive measures emanating from the investigations are very strongly recommended:—

Care in preventing contamination of the starter; the use of modern milk vessels and vats which can be thoroughly sterilised; wherever possible sterilisation of all utensils and dairy and factory equipment.

Curd piled too high in the vat or cooler, and if not sufficiently turned, has a bleaching effect on the cheese, but it must not be confounded with discoloration.

Only cheese colour of a guaranteed quality should be used. Inferior colour is positively dangerous, as results have too clearly proved.

Finish

A cracked rind may follow over-acidity, insufficient moisture, over-scalding the curd; excess of salt contributes to the defect. A premier cause is moisture collecting behind the rind, and with too high a temperature of the ripening room the inside pressure

against the wall causes fractures. Over-pressing must be avoided.

Cracking may be prevented by bathing the newly-pressed cheese in hot water at a temperature of 135° F. for one minute.

Moulds.—White moulds indicate an excess of whey and of acid. It frequently happens, when the cheese is sour, there is a white mould coloration on the outside. It is recommended to sponge the mouldy cheese with hot water containing a little ammonia.

Red Coloration.—Red colour on the rind is caused by chromogenic organisms. This coloration may be seen immediately beneath the rind, and it will develop and penetrate an inch or more into the cheese. The author has noted this, and the coloration is invariably accompanied by other defects in quality. It is apparent from the author's observations that the chromogenic bacteria can work in the absence of air. Active and penetrating coloration has been found in hard dry Cheddar cheese with an exceptionally thick hard rind. The excess of whey immediately behind the rind no doubt contributes to the coloration.

Other Defects

Bleeding or Leaking.—When moisture is noticed running from the cheese in the ripening room, it indicates either over-ripe milk or too much acid in the curd. Acid milk or curd causes a dry and mealy texture and cheese poor in butter-fat. What is known as acid-cut cheese is the result of similar

mistakes. Leaking is also caused by excess of acid at whey drawing ; in other words, the making has not been kept in advance of the acidity. When the acid has developed to a certain extent, the moisture cannot be expelled in the later stages of manufacture.

Cheese Poor in Fat.—Poor milk and partly skimmed are chiefly responsible. Piling curd too deep and too much pressure and salting at a high temperature give rise to loss of fat in the cooler and press. Great care is needed in deciding the temperature at the time of salting the curd. Some makers prefer not to go below 82° F., and not higher than 86° F. *It cannot be too often repeated that the temperature when pressing influences the ripening of the cheese.*

Butter fat deposits may be caused by scalding at a high temperature and piling the curd too deep in the cooler. Over-stirring after milling and salting when the curd is too firm are also hurtful.

Bandaging.—Coarse thick bandages and badly-fitting caps interfere with the ripening of the cheese, chiefly because of their influence on evaporation. A weak rind and insufficient bandaging admits air, and if the body of the cheese is weak, mould will penetrate and grow. Good-quality bandages and caps are strongly recommended.

Crates.—Neatness of crates is a feature which attracts and adds to confidence. But more is required. Capacity and ventilation embrace much. When green cheese are badly ventilated and tightly crated, defects in quality follow and are readily

recognised. Suffocation of the cheese is the direct cause. The New Zealand crate is standardised and is a good model.

CHESHIRE

Moulds and yeast do serious damage to flavour. Cheshire cheese may be said to be midway between Cheddar and Wensleydale, and lends itself to mould coloration. Advantage is taken of this in the manufacture of blue-veined Cheshire cheese. An excellent quality can be made by dusting specially-prepared mould over the curd during hooping. Cheshire cheese requires standardising in quality, and a system of grading is very necessary in the face of present-day competition. Fixity of flavour should be closely studied.

Flavour.—Choice Cheshire cheese has a mild clean acidity and a delicate creaminess, and the cheese should dissolve in the mouth more readily than Cheddar.

A bitterness in taste often follows a chill in the manufacture of the cheese, also immediately after the cheese has left the press and during the early stage of ripening. The temperature of Cheshire cheese in the press is of very great importance to ripening and quality.

Yeast and mould taints are a source of much danger, and pasteurisation of the milk may be attended with good results.

Texture should be smooth to the touch and soft and even. A tough and corky texture shows low

acidity ; in other words, sweetness. Pastiness or soapiness may result from sweetness at the time of grinding the curd. A dry, hard or very crumbly texture should cause an examination to be made of the cheese for fat. Frequent fat tests contribute to a more uniform quality of cheese.

Colour may be either light yellow or deep. Mottle and streakiness are serious defects. Uniformity counts with the grader.

Finish.—The shape is very important. A cheese with convex ends and sides which will not stand firm, usually lacks body, and is likely to be faulty in flavour and texture. This is caused by want of acidity during making, and also by the growth of moulds in the cheese. A cheese with concave ends is often hard and dry through too much acidity and does not ripen properly. The bulging of cheese may be an indication of a spongy or holey texture, caused by the presence in the curd of gas-producing bacteria, such as *B. coli*, or yeast, resulting in a blown cheese. Red or black spots on the rind should be carefully noted, as they are serious defects and indicate over-acidity. A soft and springy cheese points to a weak body following insufficient acid. Leaking during ripening shows too much acid before vatting.

LANCASHIRE

It is a fatty cheese of delicate body, and a choice Lancashire has much to commend it for nutriment and digestibility. Like Cheshire, the cheese is subject to the

ravages of mould. Fixity of flavour has a valuable application to Lancashire cheese. A grading system is also recommended, and should offer no serious difficulties.

Flavour.—A sweet clean acidity is a characteristic, and the cheese dissolves even more readily in the mouth than Cheshire.

Texture and Colour.—The same remarks apply to this cheese as to Cheshire.

Finish.—The rind should not be hard and thick like a Cheddar, and mould on the outside of the cheese is detrimental.

DERBY

The flavour is mild and rich and the texture flaky and closer than Cheshire. The texture is soft, smooth, and buttery, giving clear indications of an abundance of fat.

The rind of Derby cheese is fairly hard and thin. The coat cannot be said to withstand much tear and wear and, consequently, is not suited to transport like Cheddar. It is chiefly made locally and consumed locally, like Lancashire and Leicestershire cheese. Unlike these varieties, however, Derby cheese is marketed with green mould on the rind, which should be evenly distributed.

BLUE-VEINED CHEESE

STILTON

Coat.—The grader pays more than usual attention

to the outside appearance of this variety of cheese. It can tell him much. A good coat is well crinkled and regular, and not tough and leathery ; colour, brown-drab.

Flavour.—Mild, rich, creamy, which is directly associated with a high fat content in the milk and satisfactory hydrolysis of the fat by the *Penicillium* mould. A cold, dull flavour frequently follows a low fat content and a slow and sluggish growth of the mould. In such cases the mould is impoverished, that is to say, there is a shortage of its food supply, namely, fat.

A choice Stilton dissolves readily in the mouth.

Texture.—A soft Stilton will not ripen ; it will putrefy. The blue mould should be evenly distributed, and not in streaks. Between the veins of mould the colour of the cheese should be white ; any discoloration is a serious defect. A brown colour is a symptom of sweetness.

To touch, a choice Stilton is smooth, soft, and buttery. Dry, crumbly or soapy cheese are grave defects.

Finish.—There should be no broken corners or damage to crinkling, no hollow ends or falling in of the body of the cheese.

Slip-coat is a defect caused by an accumulation of whey behind the “ rind.”

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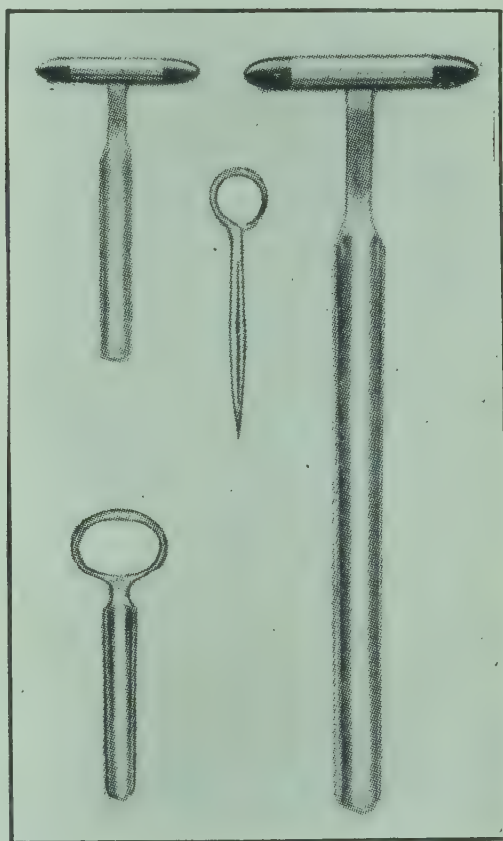
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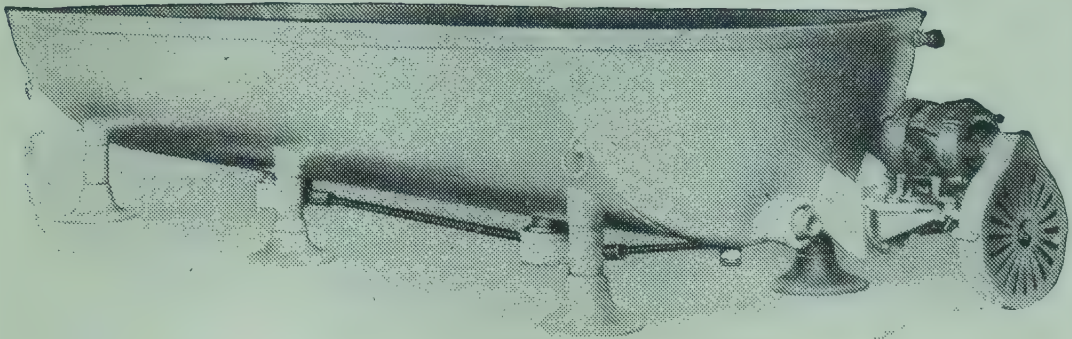
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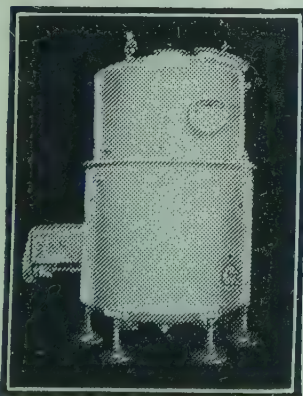
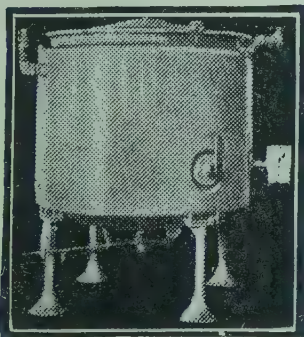
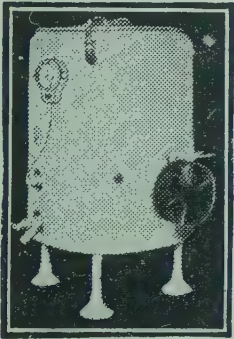


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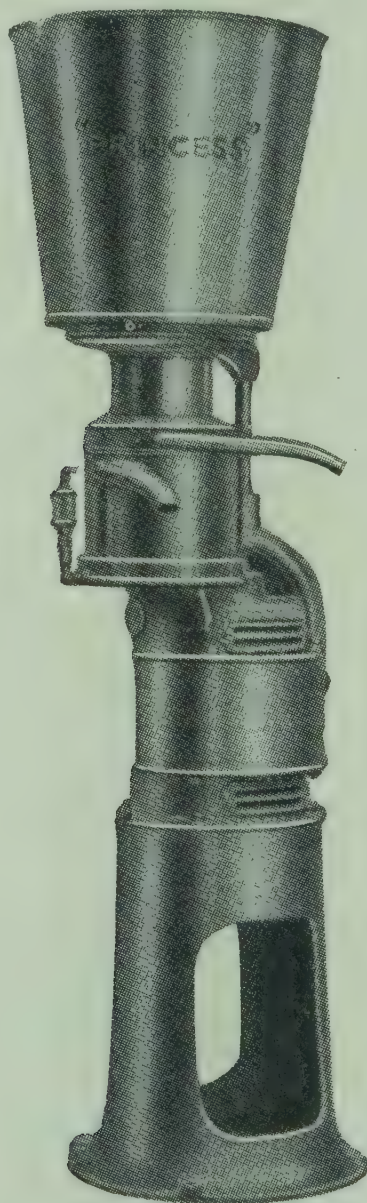
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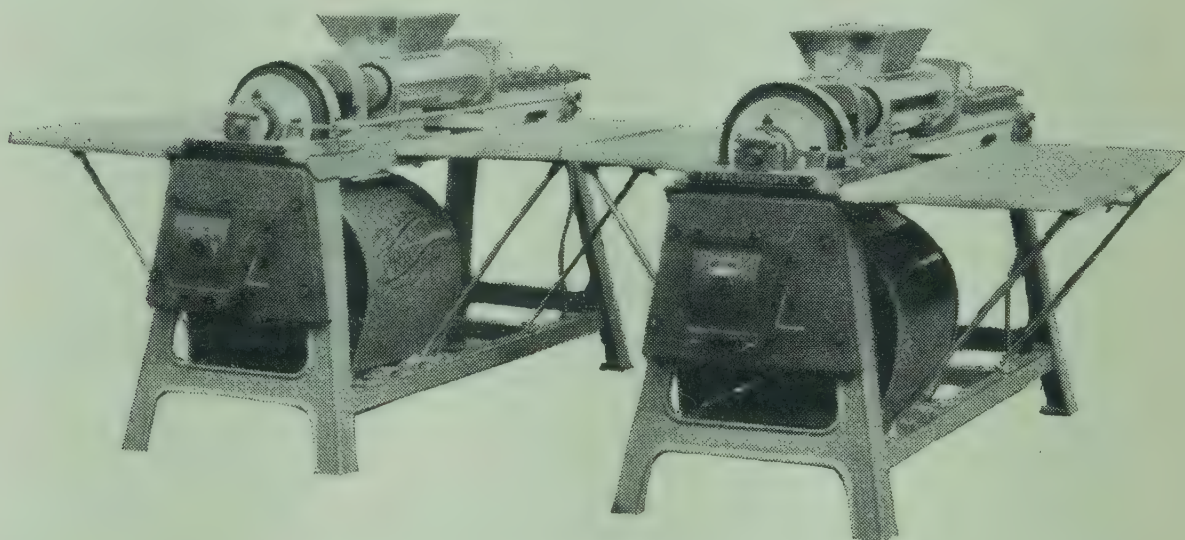
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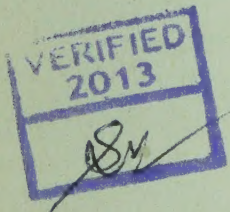
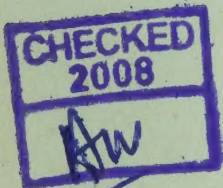
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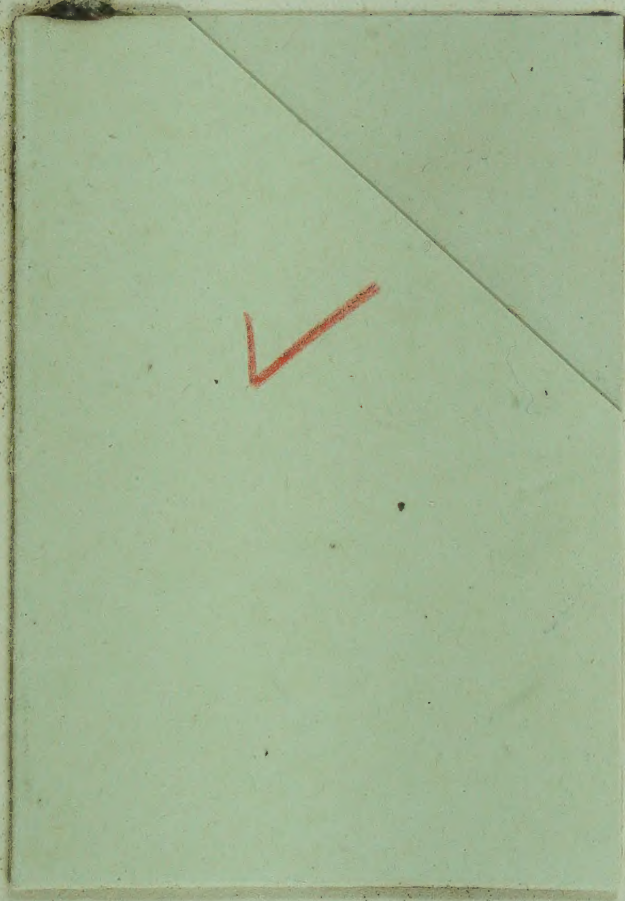


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